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BEAUTIES

OF

STURM's REFLECTIONS;

IN

LESSONS

ON THE

WORKS OF GOD,

AND OF HIS

PROVIDENCE.

RENDERED FAMILIAR TO THE CAPACITIES OF YOUTH

BY ELIZA ANDREWS,

Author of Allegorical Miniatures, the Brothers, &c.

The Fourth Edition.

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THE

BEAUTIES

OF

STURM'S REFLECTIONS.

LESSON I. FIRST WEEK.

MEDITATIONS ON NEW-YEAR'S DAY.

I REPRESENT to myself this first day of the year, as if it were the first day of my life; and I presume to hope, from the blessings received, that this year will equal those which have been granted me from my birth till now. What may I not hope from my heavenly Father, who, from the first moment of my existence, provided for me with so much tenderness and goodness? In my parents he gave me friends, who, from my very birth, supported and brought me up, and whose disinterested affection protected me in that weak and helpless state. Without such care, how could I have been preserved to enjoy the many blessings I now possess?

I enter with the present day into a new period of life, not so much unprovided for, nor so helpless, as when I first came into the world, but with equal occasion for assistance in many respects. I require friends to add to the comforts of my life, to support my spirits, when oppressed with grief, and to warn me of dangers that I might otherwise fall into. And surely my heavenly Father will grant me this best of blessings. Whatever may happen to me during the course of the year, he has undoubtedly chosen for me a friend and comforter, who will be my adviser in difficulties, and my consoler in misfortunes; who will share the sweets of prosperity with me, and in moments of weakness will aid and support my reason. If in the course of the year I experience any misfortune, which I could not foresee; if any unforeseen happiness fall to my lot; if I have any loss to bear which I could not expect; all will work together for my good. Full of this conviction, I begin the new year. Let what will happen, I shall be more and more confirmed in the persuasion, that God will be my preserver in my old age, as he was in my youth. If I find myself exposed to poverty and distress, I hope to remember the days of my helpless infancy, that more critical state, in which he protected me. If I meet with ingratitude from a friend, even *that* ought not to make me unhappy. He who created me can raise up other friends, in whose tenderness I may enjoy delight and comfort. If my days be full of danger, and persecution be my lot, even these ought not to terrify me; I should put my trust in that power which protected my childhood when it was exposed to many dangers.

LESSON II.

DAILY PROOFS OF A UNIVERSAL PROVIDENCE.

NOT to acknowledge the hand of Providence, but in extraordinary cases, is to betray our ignorance and our weakness: things daily offer which ought to excite our attention and our admiration. The formation of a chicken in an egg, is as great a miracle of the power and wisdom of God, as the creation of the first man formed out of the dust. Likewise the preservation of our life, if we reflect on the several causes and effects which combine for that purpose, is no less wonderful than the resurrection of the dead. The only difference between them is, that one happens but seldom; while we every day witness the other. This is the reason it does not strike us more sensibly, or raise our admiration as it would otherwise do. Undoubtedly, my own experience ought to convince me fully, that a Divine Providence watches over the preservation of my days. I am not certain of a single moment of my life. I feel how incapable I am of preserving my life, or of preventing many an infirmity, or danger, with which I am threatened. Subject to so many wants, both mental and bodily, I am thoroughly convinced, that, were it not for the tender mercies of God, I should be a very wretched creature. The union of my body and soul, their reciprocal and continual acting on each other, are inconceivable, and neither depend on my will or power. The beating of my pulse, the circulation of fluids within me, goes on without interruption, and without my being able to contribute to it in the smallest degree. Every thing convinces me that my faculties, my state, the duration of my existence, does not depend on my will. If my breath be not stopped; if my blood still circulates; if my limbs have not yet lost their activity; if the organs of my senses have preserved their play; if, in this instant, I have the faculty of thinking, and the use of my reason; it is to God alone that I am indebted for it. But why do I reflect so seldom, and with so little gratitude, on the daily ways of Providence? Ought not the reflections which now offer themselves, to have always been imprinted on my heart? Ought I not, at least, every morning and evening of my life, to meditate on the benefits of my Creator; admire and thank him for them? How just that I should do so! and that, by this homage, I should distinguish myself from the brutes, who have not received the faculty of contemplating the works of their Creator.

LESSON III.

THE CARE WHICH PROVIDENCE TAKES OF ANIMALS DURING THE WINTER SEASON.

HOW many rational beings, dispersed in the different countries of the world, are provided at this season, with all the necessaries of life. The greater their number, the greater variety of wants they have, according to their condition, their age, and their manner of living. Unable to form a plan, and take secure measures for our own preservation, the many arrangements, so full of wisdom and goodness, made by our Creator to provide for it, deserve our attention and admiration. But there would be a sort of selfishness in confining the divine goodness and wisdom to the preservation of mankind alone, without remembering the care that Providence also takes of animals during winter. A care which he extends to creatures much greater in number on the earth, than the rational beings who inhabit it.

That the prodigious number of animals which our globe contains, should find food or habitation in summer, is not surprising, because all nature then is disposed to concur towards that end. But that in this season, the same number of creatures, those millions of quadrupeds, of reptiles, of birds, of insects, and fishes, should continue to exist, is a circumstance which must excite the admiration of every one capable of reflection. Nature has provided most animals with a covering, by means of which they can bear the cold, and procure themselves food in winter, as well as in summer. The bodies of wild beasts, which inhabit forests and desarts, are so formed, that the hair falls off in summer, and grows again in winter, till it becomes a fur, which enables the animal to endure the most severe cold. Other kinds of animals find an asylum under the bark of trees, in old crevices, in hollows of rocks, and caves, when the cold obliges them to quit their summer dwelling.

It is there, that some carry before-hand the food which is to serve them, and thus live on what they have gathered in the summer; others pass the winter in profound ſleep. Nature has given to several sorts of birds an instinct which prompts them to change place at the approach of winter. They are seen flying in great numbers into warmer climates. Several animals, who are not designed to travel, find, notwithstanding, their wants supplied in this season. Birds know how to find out insects in moss, and in the crevices of the bark of trees. Several kinds of quadrupeds carry provision in the summer time into caves, and feed on it in winter. Others are obliged to seek their subsistence under the snow and ice.

Adore, with me, our almighty and gracious Preserver, whose goodness and majesty do not make him disdain attention to the weakest creature existing under the heavens.

From the elephant to the mite, all animals owe to him their dwelling, their food, and their life; and even where nature herself seems barren of resources, he finds means to make amends for her poverty.

How can anxiety, care, or anguish, get access into *our* hearts, or make *us* despair of being preserved during the winter?

In fine, let these reflections lead us to imitate, as much as our faculties will permit, the generous cares of Divine Providence, in contributing to the preservation and happiness of our fellow-creatures, and even to the welfare of every living animal. To be cruel towards animals, to refuse them food and indispensable conveniences, is to act manifestly contrary to the will of our common Creator, whose beneficent cares extend even to those beings which are inferior to us. And, if animals have a real right to our attention, how much more are we obliged to soften, as well as we can, the evils of our fellow-creatures? Let it not be sufficient for us to supply our own wants, but let us endeavour to supply those of others; and never suffer any one to sink under misery, whom it was in our power to relieve.

LESSON IV. SECOND WEEK.

VEGETABLES WHICH PRESERVE THEIR VERDURE IN WINTER.

THE earth may now be compared to a mother who has been robbed of those children from whom she had the best hopes. She is desolate, and deprived of the charms which varied and embellished her surface. However, she is not robbed of all her children. Here and there, some vegetables are still to be seen, which seem to defy the severity of the winter. Here the wild hawthorn shows its purple berries; and the laurestina displays its blossoms in clusters, crowned with leaves which never fade. The yew-tree rises like a pyramid, and its leaves preserve their verdure. The ivy, ever green, still creeps along the walls, and clings immovable, while the tempest roars around it. The laurel extends its green branches, and has lost none of its summer ornaments. The humble box shows here and there, in the midst of the snow, its ever-green branches. These trees are emblems of the durable advantages which *he* possesses, whose mind is cultivated, and whose temper is sweet and serene. The splendour of dress, which only dazzles the eyes of the vulgar, is a trifling and transient splendour. The most brilliant complexion will fade, and all outward beauty is of short duration; but virtue has charms which survive every thing. The man who fears the Lord, is "like a tree planted by the side of a rivulet. It grows and flourishes, and its branches extend far off. It bears fruit in due season, and its leaves fade not."

What a delightful image is this of a pious man! He borrows not his value from the exterior and arbitrary goods of fortune. His true ornaments are in himself. The storms of adversity may sometimes shake him, but they cannot overpower him; and he soon rises again above the stormy regions. If he be reduced to poverty, he is still rich in possession of the favour of God, a good conscience, and the hope of a blessed immortality.

This meditation leads me to the idea of a benevolent old man. In the winter of his life, he resembles the plants which preserve their verdure, even in that season of life. How many storms of fortune has he supported with constancy! How many attracting objects has he seen wither! He yet exists, while most of those of his time have disappeared. A mild cheerfulness is seen in him, the happy remains of his spring.

Shortly will the beauty of my body fade like a summer flower. Happy, then, if I have no reason to regret the loss of it! Happy, if I find myself adorned with those attractions which have their source from wisdom and virtue, and which will not wither even in the grave!

LESSON V.

THE ADVANTAGES OF THE CLIMATE WE INHABIT.

LET us sensibly feel how happy we are in all respects. For the blessings of our heavenly Father are poured upon us on every side. The prospects of our forests, our meadows, our hills; the pure and temperate air which surrounds us; the day, the night, the seasons of the year, and the variations which attend them; all prove to us the goodness of our Creator, and the greatness of our felicity. Can we then be discontented with the lot which is fallen to us, murmuring that we have not a perpetual summer, that the rays of the sun do not constantly ſhine upon us, and that an equal degree of warmth is not always felt under our zone! What ingratitude, and at the same time, what ignorance! Indeed, we know not what we wish, nor of what we complain. It is through carelessness or pride that we disown the goodness of God, who has been particularly favourable to our countries? We murmur often at the severity of winter. We are ready to envy the inhabitants of places, where this change of seasons is unknown; but it is precisely the winter, which makes the climate we live in one of the most healthy in the world. In hot countries, they are more exposed to epidemic disorders, than where the sun reflects less heat; and the people are not so long lived as in our climate. Besides, it is observed that men are less robust, and population not so great, as among us: and when the cold is at the highest possible degree with us, we are still much warmer than the inhabitants of those countries, where the cold is much greater, and lasts much longer; so that our severest winters would appear to them to have the mildness of autumn. Let us compare our lot with that of the inhabitants of the northern part of our globe. Here some rays of the sun come to brighten our cloudy days in winter, and revive our spirits: we see the succession of the day and night;—there, many worthy families pass very long days in darkness.

LESSON VI.

CONTEMPLATION OF THE STARRY HEAVENS.

AT night the sky presents us a sight of wonders, which must raise the astonishment of every attentive observer. But from whence comes it, that so few consider the firmament with attention? I am willing to believe, that in general it proceeds from inattention; for it is impossible to view the immense bodies which are in that space, without admiring the greatness of the artificer. It is in the centre of our system that the sun is established. That body is more than a million of times larger than the earth. It is one hundred millions of miles distant from it, and notwithstanding this prodigious distance, it has a most sensible effect upon our sphere. Round the sun move seventeen globular bodies, seven of which are called planets, the other ten, moons or satellites; they are opaque, and receive from the sun, light, heat, and perhaps also, their interior motion. Georgium Sidus, Saturn, Jupiter, Mars, the Earth, Venus, and Mercury, are the names of the seven principal planets. Of these seven, Mercury is nearest the sun; and for that reason is mostly invisible to the astronomer. As he is nearly nineteen times smaller than our earth, he contributes but little to adorn the sky. Venus follows him, and is sometimes called the morning, and sometimes the evening star. It is one of the brightest of the heavenly bodies, whether it precedes the rising, or succeeds the setting of the sun. It is nearly as large as our earth, and is about sixty-eight millions of miles distant from the sun. After Venus comes our Earth, round which the moon moves as a secondary planet. Mars, which is the fourth planet, is seven times smaller than our globe; and its distance from the sun is one hundred and forty-four millions of miles. Jupiter, with his belt, and four moons or satellites, is always distinguished by his splendour in the starry sky, and is eight thousand times larger than our earth. Saturn, who is accompanied by five moons, and a luminous ring, and whose distance from the sun is upwards of nine hundred millions of miles, was thought the remotest planet until the late discovery of the Georgium Sidus, whose distance is eighteen thousand millions of miles, and its magnitude eighty-nine times greater than our earth. In the mean time, the sun, with all the planets which accompany it, is but a very small part of the immense fabric of the universe. Each star, which, from hence, appears to us no larger than a brilliant set in a ring, is in reality an immense body, which equals the sun both in size and splendour. Each star, then, is not only a world, but also the centre of a planetary system. It is in this light we must consider the stars, which shine over our heads in a winter night. They are distinguished from the planets by their brilliancy, and are called fixed stars, because they never change their place in the sky. According to their apparent size, they are divided into six classes, which comprehend altogether about three thousand stars. And there are innumerable other stars, not to be discovered by the naked eye.

If we reflect on the distance between the fixed stars and our earth, we shall have new cause to admire the greatness of the creation. Our senses alone make us already know that the stars must be further from us than the planets. Their apparent littleness only proceeds from their distance from the earth. And their prodigious distance and their brightness tell us,—they are suns which reflect, as far as to us, not a borrowed, but their own light.

How great then must be that Being who has created those immense globes! Who has regulated their course, and whose mighty hand directs and supports them.

LESSON VII. THIRD WEEK.

THE ADVANTAGES OF NIGHT.

ALTHOUGH we are deprived of some pleasures, now that the sun withdraws its light from us so soon in the evening, and the greater part of our time is passed in darkness; nevertheless, we have no cause to complain of this arrangement in nature. As the mixture of pleasure and pain, of good and evil, is always wisely ordained; so do we find the same provident goodness of our Creator in this remarkable variation in our climate. Each night may remind us of the mercy of the Almighty, who, for the good of mankind, has spread light and beauty over the earth. It may remind us of the misery in which we should languish, if day did not succeed to night. And does not even darkness obtain for us a great advantage, by inviting us (from the tranquillity and repose which attends it) to enjoy a sweet sleep? If long nights be disagreeable to some, to how many others are they a blessing? Without the night the astronomer could not have formed an idea of the distance, the size, the course, and the infinite number of planets and stars; nor could the pilot make use of the northern star. Considered in another way, night still appears a benefit to mankind, in lessening our wants, and in putting an end to those which, in the day time, cost us many cares. How many families, oppressed with want, begin the day with anxiety, and end it in hard labour! Night comes,—and care and misery are suspended. To be happy then, nothing but a bed and covering is wanting; and if sleep closes our eyes, all our wants are satisfied. Night, in some degree, equals the beggar with the monarch:—both enjoy a blessing which cannot be purchased. O how gracious that Being who combines all things for the happiness of mankind! Most things, which are called evils, are only so to those who let themselves be carried away by prejudice and passion; whilst, if they were considered as they ought to be, it would appear, that these apparent evils are real blessings to the world. We may be assured, that several millions of our fellow creatures, who are in the day-time employed in hard work, or fatiguing labour; and others, who have groaned all day under the yoke of an enemy to humanity, will bless God at the approach of night, which brings rest with it.—Let us also bless him the beginning of each night.—We shall undoubtedly do so, if, having the wisdom to employ the day well, we acquire a sweet and sound sleep. The shorter our days are, the higher we ought to value every hour, and make a prudent use of them. The night approaches, in which it will no longer be in our power to work or act. But that long night will still be to us a blessing, if we enjoy in the grave that peace, that rest, which are the fruits of Christian labours.

LESSON VIII.

THE REPOSE OF NATURE DURING WINTER.

THE winter days are days of rest to nature. In the preceding months, she employed herself in fulfilling the designs of the Creator, by labouring in the service of his creatures. How rich was the spring in blossoms! How many seeds it opened! And what abundance of fruit the summer has ripened for us to gather in autumn! Each month, each day, we receive some presents from nature. Is there a single instant in which she has not pleased our sight, delighted our smell, or indulged our taste; and has she not often satisfied them all at the same time? It is for us, and thousands of birds, beasts, or insects, that she has caused the grass to grow; that she has loaded the trees with blossoms, with leaves, and with fruit; she has covered the meadows with corn, and the creation is adorned with a thousand charms. Tired of so many cares, nature now rests; but it is only to collect new force, to be employed again for the good of the world. However, even this rest, which nature enjoys in winter, is a secret activity, preparing in silence a new creation. Already the necessary dispositions are making, that the earth may recover, at the end of a few months, what she has lost. Already the corn shoots, which is to serve us for food. Already the fibres of plants insensibly open, which are to adorn our gardens and fields. Here again, O beneficent Creator, I adore thy power and wisdom. The rest which nature takes is not less interesting to us, nor less worthy of entering into the plan of thy wise Providence, than the activity she shows in spring and summer. It has been thy will that each moon should vary the scenes of nature, in the time and manner most proper for the perfection of the whole. I discover, and am more and more convinced, that all the plans of thy Providence, however extraordinary they may appear to my weak reason, are full of wisdom and goodness. At present, that I see the earth covered with a mantle of snow, which keeps it warm, I will reflect on the good that results from it: for how could I promise myself flowers and fruit, if nature did not, at this time, enjoy some rest?—How could I reap the fruits of harvest, if thou didst not already, under the snow and ice, dispose the seed to flourish? Yes, Lord, it is thou, who, in granting rest to the earth, enrichest man with a thousand blessings. And for me also, O Father! there will come a day of rest; a day in which I shall rest from all trouble, sorrow, or cares. Thou hast wisely appointed the time I should devote to activity. It is the spring and summer of my life, which must be employed in the service of my fellow-creatures. The autumn will soon come. Grant, that I may then resemble one of those fruitful trees, which pours upon us fruit in abundance. But in the winter of life, when I shall be covered with grey hairs, and full of days, I could wish that my rest should be as honourable and beneficent as that of nature in winter. How happy should I be, if my contemporaries should say, when speaking of me, "That old man formerly devoted his youth in striving to serve mankind: his life has never been void of activity or of use. Now, even his calm old age is not idle: by his wise experience, he contributes to the happiness of his family and friends: he labours at least for the world to come, of which he will soon be an inhabitant."

LESSON IX.

THE LAPLANDERS.

I BEGIN this meditation with a lively sense of gratitude towards my Creator, and of pity to those of my fellow-creatures, to whom nature has more sparingly distributed her blessings. I fix my eyes now on the Laplanders, and the inhabitants of the lands nearest the arctic pole: mortals, whose taste and manner of living, when compared with ours, are not the happiest. Their country is formed of a chain of mountains covered with snow and ice, which does not melt even in summer; and, where the chain is interrupted, bogs and marshes fill up the space. Winter is felt during the greatest part of the year; a deep snow overwhelms the valleys and covers the little hills: the nights are long, and the days give but a very dim light. The inhabitants seek shelter from the cold in tents, which can be removed from one place to another. They fix their fire-place in the middle of it, and surround it with stones. The smoke goes out at a hole, which also serves them for a window. There they fasten iron chains, to which they hang the caldrons, in which they dress their food, and melt the ice which serves them for drink. The inside of the tent is furnished with furs, which preserve them from the wind; and they lie on skins of animals, spread upon the ground. It is in such habitations that they pass their winter, surrounded by the howling wolves, who are running every where in search of their prey. How could we bear the climate and way of life of those people? How much we should think ourselves to be pitied, if we had nothing before our eyes but an immense extent of ice, and whole deserts covered with snow; the absence of the sun still making the cold more insupportable? And if, instead of a convenient dwelling, we had only movable tents, made of skins; and no other resource for our subsistence, but in painful and dangerous hunting for it? If we were deprived both of the pleasures which the arts produce, and the society of our fellow-creatures to sweeten life.

Are not these reflections proper to make us observe the many advantages of our climate, so little attended to? Ought it not to animate us to bless the Divine Providence, for the many thousand advantages we enjoy? Yes: let us ever bless that wise Providence: and when we feel the severity of the season, let us return thanks, that the cold is so moderate where we dwell, and that we have such numerous ways of guarding against it.

But is the inhabitant of northern countries so unhappy as we imagine? It is true that he wanders painfully through rough valleys and unbeaten roads, and that he is exposed to the inclemency of the seasons. But his hardy body is able to bear fatigue. If the Laplander be poor, and deprived of many of the conveniences of life that we enjoy; is he not rich, in knowing no other wants than those which he can easily satisfy? He is deprived for several months of the light of the sun; but in return the moon and the Aurora Borealis come to light his horizon. Even the snow and ice, in which he is buried, do not make him unhappy. Education and custom arm him against the severity of his climate. The hardy life he leads enables him to brave the cold: and for the particular wants which are indispensable to him, nature has made it easy for him to supply them. She has pointed out to him animals, whose fur saves him from the sharpness of the air. She has given him the rein-deer, which furnishes him, all at once, with his tent, his dress, his bed, and his food: with this animal he undertakes long journeys, and which, in a word supplies almost all his wants, and the maintenance of it is no expence or trouble to him. And, if it be true that the idea we form of happiness depends more on opinion than on reason; if it be true also that real happiness is not fixed to particular people, or particular climates; and that, with the necessaries of life and peace of mind, one may be happy in every corner of the earth; have we not a right to ask, What the Laplander wants to make him happy?

LESSON X. FOURTH WEEK.

THE WISE ORDINANCE OF OUR GLOBE.

WHEN I reflect on the enormous mass which composes our globe, I have new reason to admire the supreme wisdom. If the earth were softer or more spongy than it is, men and animals would sink into it. If it were harder, more compact, and less penetrable than it is, it would resist the toil of the labourer, and would be incapable of producing and nourishing that multitude of plants, herbs, roots, and flowers, which now spring out of its bosom. Our globe is formed of regular and distinct strata; some of different stones, others of several metals and minerals. The numerous advantages which result from these, particularly in favour of mankind, are evident to all the world. Where should we have sweet water, so necessary to life, if it were not purified, and in a manner filtered, by the strata of gravel in the earth? The surface of the globe offers a varied prospect; an admirable mixture of valleys and mountains. Who is there that does not see clearly the wise purposes of the Author of nature, in thus diversifying this surface? How favourable is this variety of valley and mountain to the health of living creatures! How much more proper to produce the various species of plants and vegetables! If there were no hills, the earth would be less peopled with men and animals: we should have fewer plants, fewer simples and trees: we should be totally deprived of metals and minerals: the vapours could not be condensed; and we should have neither springs nor rivers.

Who can help acknowledging that the whole plan of the earth, its form, its exterior and interior construction, are regulated according to the wisest laws, which all combine towards the pleasure and happiness of living creatures! To convince us of this, we need only reflect on the form of the earth. It is known to be almost in shape like a ball. And, with what view did the Creator choose that form? In order that it should be inhabited, over the whole surface of it, by living creatures:—and this would not have been accomplished, if the inhabitants of the earth had not every where found sufficient light and heat; if water had not been easily spread in all parts of it; and, if the circulation of wind had met with any powerful obstacles. The earth could not have any form more proper to prevent these inconveniences. Without this form, the revolutions of the day and night, the changes in the temperature of the air, cold, heat, moisture, or dryness, could not have taken place.

Supreme Author of nature, thou hast ordered every thing on earth with wisdom! Wherever I turn my eyes; whether I examine the surface; whether I penetrate into the interior structure of the globe thou hast appointed me to inhabit; I every where discover marks of profound wisdom and infinite goodness.

LESSON XI.

SUBTERRANEOUS FIRES.

BY digging only a short depth into the earth, a greater degree of cold is felt than on the surface; because the latter is heated by the sun; but if we go fifty or sixty feet deep, the heat increases sensibly; and, if a still greater depth be gone to, the air becomes so close, that it stops respiration, and puts out a candle. It is not easy to determine the cause of this heat. Those who admit that there are concealed fires in every place under the earth, approach, perhaps, the nearest to the truth. But how this fire, so closely confined, can burn;—what the substance is that feeds it,—or how it can be burned without consuming,—is what cannot be determined with certainty. There are phenomena on our globe, which prove the existence of subterraneous fires in a very formidable manner. From time to time there are terrible eruptions of fire. The two most remarkable mountains which produce such, are Etna in Sicily, and Vesuvius in the kingdom of Naples. The accounts given of these two volcanoes are frightful. Sometimes a black vapour only rises from them; at other times an inward roaring is heard; which is followed by thunder and lightning, attended by an earthquake. Then the vapour clears up, and becomes luminous. Sometimes these eruptions are so violent, that large pieces of rock, and numerous stones, are hurled into the air. The force of the interior air of these mountains is so prodigious, that, ~~in the~~ last century, pieces of rocks weighing three hundred pounds were thrown into the air, and fell at the distance of three miles. At certain times, the vitrified entrails of the earth boil up, and rise, till their formidable foaming runs over, and flows for the space of several miles through the neighbouring fields, destroying every thing in its passage: for several days one wave of fire runs over another till it reaches the sea; and even here its violence is such, that it continues to flow for some time without being extinguished in the waves of the ocean. Who can think without terror of the disasters which such eruptions occasion? Whole farms and villages, with their fertile plantations, are swallowed up: the meadows are consumed: the olive-trees and vines entirely destroyed. We are told, that in one of the eruptions of Etna, the torrent of burning lava spread itself over fourteen cities; and that the roaring within the mountain was heard at twenty miles distance.

But wherefore these volcanoes, which spread such terror and devastation on the earth? Who am I, to dare to ask such a question? Have I a right to demand an account of the plans formed by Supreme Wisdom? The existence of these volcanoes cannot be a work of chance; and I ought to conclude, that the Creator has wise reasons for ordering such to be. Whatever mischiefs these eruptions occasion; it is nothing in comparison of the advantage they are, on the whole, to our globe. The bosom of the earth being full of fire, it was necessary that there should be volcanoes, because they are the vents by which the force of that dreadful element is broken and weakened. And though the countries where the subterraneous fires collect in greatest quantities, are subject to earthquakes, they would be still more violent, if these volcanoes did not exist. Italy would not be such a fertile country, if now and then, the fire which the earth contains had not found a vent in these mountains. This is enough to convince us, that they contribute to fulfil the designs of our divine Author, so full of wisdom and goodness, And if there still remain things to us obscure and impenetrable, let us put our hands to our mouths, and say, "Lord, thy judgments are right and equitable, and thy ways past finding out."

LESSON XII.

THE RAPIDITY WITH WHICH THE HUMAN LIFE PASSES AWAY.

OUR life is short and transitory. This is an incontestible proposition; though, to judge from the conduct of most people, one would not suppose it a received truth. Let us consider only with what swiftness the days, the weeks, the months, and the years have passed, or rather flown away. They were over, even before we perceived it. Let us endeavour to recal them to mind, and to follow them in their rapid flight. Is it possible to give an account of the different æras? If there had not been in our lives certain very remarkable moments, which made impression on our minds, we should be still less able to recollect the histories of them. How many years of our infancy, devoted to the amusements of youth, which we can say nothing of, but that they have glided away? How many others have passed in the thoughtlessness of youth; during which, misled by our inclinations, and given up to pleasure, we had neither the wish, nor the time, to look into ourselves? To these years succeeded those of a riper age, more capable of reflection. We then thought it was time to change our way of life, and to act like reasonable men; but the business of the world took possession of us to such a degree, that we had no leisure to reflect on our past lives. Our families increased, and our cares and endeavours to provide for them increased in proportion. Insensibly the times draw nigh, in which we arrive at old age; and perhaps, even then, we shall neither have leisure nor force of mind to recollect the past, to reflect upon the period to which we are come, upon what we have done, or neglected to do; in a word, to consider the purposes for which we were placed in this world. In the mean time, what can insure our ever attaining that advanced age? How many accidents break the delicate thread of life, before it comes to its full length!—The new-born infant falls, and is shortly reduced to dust. The young men and maidens, who give the highest hopes, are cut down in the age of bloom and beauty;—a violent illness, an unfortunate accident, lays them in the grave. Dangers and accidents multiply with years; negligence and excess lay the seeds of maladies, and dispose the body to catch those that are epidemical. The last age is still more dangerous. In a word, half of those who are born, are carried out of the world and perish in the short space of their first seventeen years. Behold the concise, but faithful history of life! Let us think seriously of this; every instant is a portion of life impossible to recal, but the remembrance of which may be either the source of joy or sorrow.

LESSON XIII. FIFTH WEEK.

OUR DUTY IN REGARD TO SLEEP.

IT is a melancholy remark we have often occasion to make, that most people lie down to sleep with an inconceivable security. To consider it only so far as it relates to our bodies, the revolution produced by sleep ought to appear to us of great consequence; but, if we were to consider of all that might happen to us, while we are enjoying repose, it appears to me, that in consequence, we ought not to throw ourselves into the arms of sleep, without having taken proper precautions, and having, in a certain degree, prepared ourselves for it. In reality, it is not surprising, that those who in their waking hours are so inconsiderate, so negligent of every duty, should be equally so in that which relates to sleep. Let *us*, however, learn in what manner *we* may glorify the Almighty, and act as becomes the character of a Christian, in this respect. What thanksgivings are due to the Creator for the blessings of sleep! Some may not know the full value of it, as it may never have been denied to their wishes, when they have desired it. But, how soon would sickness, sorrow, fear, or old age, deprive them of the sweets of repose! Oh; it is then that they would acknowledge, that sleep is the most pressing want of nature; and at the same time, an inestimable blessing of the Deity. But, should they wait till they lose this blessing to become wise? No, but now, while they enjoy the advantages of sleep;—never let them give themselves up to it, without a lively sense of gratitude towards their Heavenly Benefactor. Let this gratitude prevent them equally from making an abuse of sleep, or, by contrary extreme, not making use of it. It is always wrong to prolong, through idleness, the hours designed for repose. Nature in this respect, as in every thing else, is content with a little; and seven or eight hours of uninterrupted sleep is as much as is necessary. But, we are not less blamable, when, through avarice, ambition, or any other motive of that sort, we lose our sleep and necessary rest. In both cases, we act contrary to the rules established by our Creator, and contrary to the gratitude we owe him for such a blessing.

Above all things, let us endeavour to go to sleep with a proper turn of mind. What should we do, if we were to know for a certainty, that, from the arms of sleep, we were to pass into those of death? Should we not employ our last moments in preparing ourselves for this passage; in recollecting our past life; in seeking, through the blood of Christ, the remission of our sins? Well then, we may, every night, consider this case possible. In each winter's night, that is to say, in the space of twelve or fifteen hours, there die many thousand people. Who can say whose name is not in the list of those which death will remove out of this world? Now I leave it to the decision of every one's heart, what they would have done, if, in the midst of their sleep, they had been called upon to appear before the tribunal of divine justice!

LESSON XIV.

THE USE OF STARS.

THE starry sky is an admirable scene of the wonders of the Most High, in the eyes of every one who loves to reflect on the works of Omnipotence. The order, the greatness, the multitude, and the brilliant splendour of those heavenly bodies, must be a most pleasing spectacle to an attentive observer. The sight of the stars alone, supposing that we knew nothing of their nature and use, would be sufficient to fill the mind with admiration and delight. For what can be seen more magnificent and beautiful than that immense expanse of the heavens, illuminated by numberless lights, which the azure sky makes appear still more brilliant; and which all differ from one another both in size and lustre. But, would a Being infinitely wise have adorned the celestial vault with so many bodies of an immense size, merely to please our eyes, and to afford us a magnificent sight? Would he have created innumerable suns, merely that the inhabitants of our little globe might have the pleasure of seeing in the sky some luminous specks, the particular nature and purpose of which they very imperfectly know. Such an idea cannot be formed by any body who considers, that there is, throughout all nature, an admirable harmony between the works of God and the purposes he designs them for; and that in all he does, he has in view the advantage, as well as the pleasure of his creatures. Indeed we cannot precisely determine all the particular ends the stars may answer; but, at least, it is easy to believe, that they must be designed for the advantage as well as the ornament of the world; and the following considerations will be sufficient to convince us of it. Among the stars that are easiest to be distinguished, there are some which we see constantly in the same part of the sky, and are always over our heads. These serve to guide travellers by sea and land, in the darkness of night. They point out the way to the navigator, and tell him when he may undertake his voyages with least danger. Other stars vary their aspect; and though they always hold the same situation, as to one another, they change the order of their rising and setting, from day to day. Even these changes, which never vary in their regularity, are of great use to us; they serve to measure time, and to determine it by settled rules. The regular revolutions of the stars mark precisely the return and the end of the season. The ploughman knows exactly, by this means, when he ought to sow seeds in the earth, and the whole progress of the country labours. However considerable the use of the stars is to our earth, it may well be presumed, that it is not the only, nor the most important object, which the Deity proposed to himself in producing so many globes of a prodigious size. Can it indeed be supposed, that the wise Creator strewed the immense expanse with so many millions of worlds and suns, merely that the small number which inhabit the earth should be informed of the measure of time, and the return of the seasons? Undoubtedly these innumerable globes are for more sublime purposes; and each of them has its particular destination. All the stars being so many suns, which can give light, animation, and heat to other globes, is it probable that the Almighty should have given them that faculty for no purpose? No, certainly; perhaps each of these fixed stars, which we see by myriads, has its worlds moving round it, for which it has been created. Perhaps, these spheres which we see above us, serve as abodes for different sorts of creatures;

and are peopled, like our earth, with inhabitants, who admire and praise the magnificence of the works of God. Perhaps, from all these globes, as well as from ours, there rises continually towards the Creator, prayers and hymns of praise and thanksgiving. How sublime is this thought, that, exclusive of the small number of rational creatures which inhabit this globe, there are innumerable numbers of them in those worlds, which appear from hence to be but mere luminous specks. It muſt be indeed out of the question, that the empire of the Most High should not be beyond the limits of our earth. Beyond this world there is an immensity, in comparison of which our globe, large as it is, can be but reckoned as nothing.

LESSON XV.

THE WONDERFUL MAKE OF THE EYE.

THE eye infinitely surpasses all the works of the industry of man. Its formation is one of the most astonishing things the human understanding has been able to acquire a knowledge of. We cannot, it is true, perceive clearly the whole art of Divine Wisdom in the formation of this fine organ; but the little we do know is sufficient to convince us of the infinite knowledge, goodness, and power of our Creator. The most essential point is for us to make use of this knowledge, weak as it is, to magnify the name of the Most High.

The very disposition of the eyes is admirable. They are placed in the head, at a certain depth, and surrounded with hard and solid bones, that they may not easily be hurt. The eye-brows contribute also very much to the safety and preservation of this organ. Those hairs which form an arch over the eyes, prevent dust or any such thing falling from the forehead into them. The eye-lids are a security; and by closing in our sleep, they prevent the light from disturbing our rest. The eye-lashes still add to the perfection of the eyes. They save us from too strong a light, which might offend us; and they guard us from the smallest particles of dust, which might otherwise hurt the sight. The internal part of the eye is composed of coats, of humours, of muscles, and veins. The tunica, or exterior membrane, which is called *cornea*, is transparent, and so hard, that it can resist the roughest shocks. Behind that there is another within, which they call *uvea*, and which is circular and coloured. In the middle of it there is an opening, which is called the *pupil*, and which appears black. Behind this opening is the *crystal*, which is perfectly transparent, and composed of several little flakes, very thin, and arranged one over another. Underneath the crystal there is a moist and transparent substance, which they call the *vitreous humour*, because it resembles melted glass. The cavity between the cornea and the crystal, contains a moist humour, and liquid as water, for that reason called the *watery humour;* which can recruit itself when it has run out from a wound of the cornea. Six muscles, move the eye on all sides, raise it, lower it, turn it to the right or left, obliquely, or round about, as occasion requires. What is most admirable is the *retina*, a membrane which lines the inside bottom of the eye; this is a web of little fibres extremely fine, fastened to a nerve or sinew, which comes from the brain, and is called the *optic nerve*. It is in the *retina* that the vision is formed, because the objects paint themselves at the bottom of the eye on that tunica or coat: and though the images of exterior objects are painted upside down on the retina, they are still seen in their true position. Now, in order to form an idea of the extreme minuteness of this picture, we need only consider, that the space of half a mile, that is to say, of more than eleven hundred yards, when it is represented in the bottom of the eye, makes but the tenth part of an inch.

My soul acknowledges the infinite power, goodness, and wisdom, of my Creator, in providing me with such a useful member. And when I see the many evils and miseries of my fellow-creatures, let not my eyes refuse them tears, nor my heart be shut to compassion. Thus shall I fulfil the views of his goodness, and make myself worthy of his approbation.

LESSON XVI. SIXTH WEEK.

ON FOGS.

AMONGST the many meteors seen in winter, one of these which merits particular attention is the fog. It is composed of watery and sulphureous vapours, which fill and thicken the air. This condensation is principally occasioned by cold; and in order to form fogs, the air muſt be sensibly colder than the earth, from whence there arise continual exhalations. All that we see, far or near, the sky or earth, appears confusedly wrapped up in a grey curtain. The eye wanders every where, without being able to distinguish objects. The rising sun labours a long time to pierce through these fogs, and to restore the earth to its former appearance. It succeeds at laſt in dissipating these vapours. Sometimes they light upon the earth, and sometimes they ascend into the middle region of air. By degrees, the objects rise out of that obscurity, and appear again in their usual state. The sky resumes all its brightness, all its serenity; and it is only near the ground, or on the roofs of houses, that any traces remain of the fog, which had for several hours covered the horizon. At the sight of this meteor, I recollect those unhappy times, when the sciences were in a manner wrapped up in an impenetrable mist of superstition and ignorance. In what thick darkness whole provinces and kingdoms were plunged before the sun of truth could show itself in all its splendour. The human understanding was so limited and shortsighted, that it scarcely comprehended the things which immediately surrounded it; and the power of error was such, that no ray of light could penetrate into those souls, darkened by prejudice and superstition. At length the sun appeared again, and suddenly enlightened countries, which, during whole ages, had been buried in thick ſhades. We learned to distinguish error from truth. A happy futurity, eternity, itself was opened to us, and we began to feel the greatness of our lot.

It is however but too true, that as long as I remain here, during the days of my earthly pilgrimage, I shall still walk in darkness. The mist which surrounds me does not permit me to have a clear and distinct view of futurity. My ignorance, my prejudice, my credulity, still increase the darkness of my present state. O may they soon be dissipated! May the light of truth and joy enlighten me in this vale of darkness! But thanks to God, a way is open to me, and I see through the shades which surround me, the path that leads to a blessed eternity. Every cloud will soon vanish, and I shall be transported to a scene of light and felicity which no shade will ever darken. There I shall know, by the light of heaven, what had appeared on earth dark and gloomy. There I shall feel the wisdom and holiness of those ways of Providence, which were here incomprehensible to me. There, my soul, penetrated with admiration and gratitude, shall behold the wonderful chain, and perfect harmony in the works of the Most High.

LESSON XVII.

THE RAIN WATERS THE EARTH AND MAKES IT FRUITFUL.

THE fertility of the earth depends chiefly on the moisture it receives from rain and other watery vapours. If the watering of the earth were left to the care of man, notwithstanding his efforts, drought and famine would destroy us. How necessary, therefore, was it, that the vapours should be collected into clouds, as in reservoirs, and fall afterwards, by the assistance of the winds, upon the earth, to water the trees and plants. Every shower of rain enriches the earth. The treasures which its surface prodigally bestows upon us are infinitely more valuable to us than all the metals and precious stones it contains in its bowels. Society might subsist very well without gold or silver, but not without corn, vegetables, and pasture.

Let us reflect on the inexpressible blessings that rain produces on our globe. A seasonable shower renews the face of the earth, and has much more force and effect than the dew, which in the night-time moistens the grass and the leaves, The furrowed fields drink with avidity the beneficent rains poured upon them. The principles of fertility unfold themselves in the seeds, and second the labour of man. The husbandman ploughs, sows, and plants, and God gives the increase. Men do what is in their power; and whatever is beyond their ability, the Lord himself provides for. In winter he covers the seed as with a garment. In summer he warms and refreshes it by the rays of the sun, and by rain. He crowns the year with his blessings, and he grants them so successively, that mankind are not merely nourished, but their hearts are filled with joy and gladness. The divine blessing does not fall on cultivated fields only; it extends also over the meadows and fields of the desarts. Even the countries that are forsaken by man, and from which no direct use is drawn, are still objects of providential care: for such is the goodness of God, that the hills and the valleys rejoice, and are adorned with smiling verdure. The rain does not fall in vain upon them. And if they do not yield fruit for our support, they are, at least, immense reservoirs of water for our earth; and they produce a great variety of wholesome plants and simples good for our health, and which serve also as food for animals.

Never let us forget these blessings, but learn to know the full value of them, and consider how gloomy, barren, and desart all nature would be, if the sky had been to us like brass, and the earth as iron. All the plants and trees would perish; every living creature would faint; the rivers would dry up; and we should breathe death in the air. Then let us not complain or murmur when the winter rains are heavy, or laſt any length of time; but rather let us bless the Creator, and praise his goodness towards us. By his order the seasons are renewed, and regularly succeed each other. It is for us that the rain falls; and makes the earth fruitful. God opens his liberal hand to do good to man. His blessings light upon our land, and fill it with peace and plenteousness. What has he not already done for us, and what may we not still expect from his goodness.

LESSON XVIII.

THE EQUAL DISTRIBUTION OF THE SEASONS.

WHEN the sun is far from us, and when the severe cold binds and shuts up our earth, there are some countries where the inhabitants enjoy all the beauties of spring; others, where they are gathering rich harvests; and others, where autumn fills their granaries with fruit. It is in this manner that Divine Wisdom has regulated the change of seasons, and distributed the same favour to all his creatures, at different times. His impartial love extends itself over every being he has made, without respect to rank, nation, or merit. It is sufficient that they require his blessings, for him to take pleasure in granting them. His beneficent views extend over the desarts of Arabia, with as much goodness, as over the smiling countries of Europe; and his government is the same from pole to pole. But if the Deity distributes the pleasures of this life equally, why are some countries deprived of the pleasures of spring, while we enjoy them in such abundance? Why are the rays of the sun so partially spread, that, in some climates there is darkness, and in others light, for whole months together? Why are not the frozen countries near the pole, as beautiful and fertile as our plains and valleys? What art thou, O man, who darest to ask such questions? What right hast thou to demand an account of the infinitely wise Being, for the manner in which he rules the world? Vain mortal, learn to be humble, and to acknowledge traces of a sovereign wisdom, in the very things, wherein thy weak understanding imagined there were defects. Perhaps thou supposest Providence has refused, to certain parts of the earth, advantages and happiness, which have been lavished with profusion elsewhere. Not so: the Creator has given to each country what was necessary to the life, support, and content of his creatures. All is planned according to the climate in which they live; and Providence has, every where, provided for their preservation and support. The hours of the day vary in different parts of the world, according to certain rules; but all the zones have nearly the same number. There is scarcely any inhabited country, which the sun shines more upon than another. All the difference is, that they enjoy it at different times. With the inhabitants of the torrid zone, the days and night are always of equal length; while, with the neighbouring zones, that is the case but twice a year. It is true, that the sun quits them by turns, and gives summer to one side of the earth, while it abandons the other to winter. But it never fails to return regularly, from one of the limits of its annual course to the other; and, if the winter days are shorter than the nights, summer makes ample amends in that respect. Even the inhabitants of the frigid zone, who are deprived of the sight of the sun for several months, see it afterwards on their horizon several following months; and though they have some hours less of day-light, they are made amends for it by long twilights. Thus we see, that the earth is full of the mercies and goodness of the Almighty, who loveth his creatures without respect to persons.

LESSON XIX. SEVENTH WEEK.

THE UTILITY OF OUR SENSES.

I HAVE senses, that is to say, I am a being, who by means of several wonderful organs of my body, can procure myself several sorts of sensations. By my eyes, I can acquire the perception of light and colours; by my ears, that of different sounds; by smell and taste, that of agreeable or disagreeable emanations of savours and scents, of sweet and bitter, and other such properties of the body, which I can make use of; and, by my feeling, I have the sense of heat and cold, of wet and dry, of soft and hard, &c. Now, I represent to myself how wretched I should be, were I deprived of these useful organs. If I had not *sight*, how could I escape that multitude of dangers which surround me, or form to myself any idea of the magnificence of the heavens, the beauty of the country, and all the agreeable objects with which the earth is filled? Without the organ of *hearing*, how could I perceive many dangers at a distance? How could I, in my youth, acquire school-knowledge, learn languages, obtain ideas, the talent of reading, and many other faculties, which distinguish me so advantageously from the brute creation? If I had been refused the organs of *smell* and *taste*, how could I distinguish, in my food, what was hurtful or otherwise? I could not enjoy the perfumes of spring, or a number of things, which now afford me such pleasing sensations. And, without my *feeling*, how should I be able to discover, either in sleep, or awake, what was hurtful to me? or, how should I be able to attend to my preservation? I cannot, therefore, give too much praise, that I see, hear, smell, and feel. Oh! may I never be insensible to the value of my senses, or make a bad use of them, since they were given me for the noblest purposes.

LESSON XX.

SINGULARITIES IN THE KINGDOM OF MINERALS.

IT would be difficult, if not impossible, for our weak and limited understandings, to take in at once the whole kingdom of nature, and to learn altogether the wonderful properties of things. We shall, more easily, obtain a knowledge of nature, if we begin by some separate objects, some particular beauties, and dwell first on the most striking phenomena. Let us, then, at present, reflect on some curiosities among minerals. We shall discover there, as every where else, traces of the infinite wisdom of the Deity. Amongst these there are few more worthy our attention than the loadstone. When this stone is suspended, it turns itself constantly, one end towards the north, and the other towards the south; and it is in those two ends, or poles, that it has the strongest power of attraction. It is remarkable, that it attracts nothing but iron: and that if two loadstones are put together, their poles of different denomination, that is to say, the southern and northern pole attract one another; whereas, the poles of the same name, that is to say, the two southern, or the two northern, repel one another, and seem to fly from each other.

There are properties found in quicksilver equally wonderful. It takes every form one wishes to give it; but it always ends by reassuming its own natural form. In the fire, it rises into a vapour. When it is shaken a long time, it changes into dust. By being dissolved, it becomes a hard and transparent crystal; but, it can always be restored to its former fluid state. Gold is the first and most valuable of all metals, not only from its scarcity, but from its admirable properties. It is the hardest and most unalterable of all bodies. It can bear, for two months, being in the hottest fire, without any sensible loss in its weight. Its parts are so fine, that a grain of beaten gold can cover fifty square inches, in such a manner, that the naked eye may distinguish on the two surfaces, four millions of particles; and its ductility is such, that, with a single grain, one may draw out a thread five hundred feet long. The wonderful form of common salt; the brilliant stones; the singular figures of the earth where the metals are concealed; the petrified bodies that are often found on the high mountains, some hundred miles from the sea, which is their original source; and a hundred other singularities in the mineral world, seem formed to awaken our curiosity. No employment whatever, has more charms, is more satisfactory, or has more variety in it, than an attentive observation of nature. Supposing we were to live ages on earth, and that we were to employ every day, every hour, in studying only the singularities amongst minerals, there would still be at the end of that time a thousand things we could not explain, which would remain hidden from us, and would, more and more, raise our curiosity. Since our lives scarce extend to half an age, let us then make good use of the little time granted us; and let us devote it, as much as our first duties will permit, to the observation of nature; and thus enjoy the most innocent and lasting pleasures of the mind. The satisfaction we shall find in it will increase more and more, in proportion as we reflect more attentively on the views the Almighty has proposed to himself in his works; for the wonders of nature are infinitely more to be admired, and more sublime, than all the productions of human art. The latter do not always promote our welfare, or make us better; they are often mere objects of fruitless admiration. But all the works of nature, and even the most singular among them, tend to the universal good of the world: they exist, not only to be seen, but also to be enjoyed; and all, without exception, proclaim the goodnesss, as well as the wisdom of God.

LESSON XXI.

WINTER IS THE IMAGE OF OUR LIFE.

IN the winter days there are continual changes. Flakes of snow and showers of rain, storms and calms, cloudy days and serene skies, succeed each other. The snow has scarce covered nature with its brilliant whiteness, when the rain comes to destroy it. The sun scarce shows itself, when it again disappears from us. Are there not the same vicissitudes in the moral world? If many of the days in winter are dark, dull, and gloomy, so are many scenes through life. But as storms and darkness are necessary, and conformable to the wise laws of nature, so are the disagreeable accidents and the adversity which we sometimes experience in the world. Who can prevent the day from being obscured by dark clouds? or our happiness from being disturbed, sometimes by others, and sometimes by accidents? How is it possible the sky should be always calm and serene? or that our minds should enjoy uninterrupted repose? The present constitution of our nature will as little admit of our being always free from pain and disagreeable sensations, as the conſtitution of the natural world would admit of the air never being loaded with clouds. Passions, which often produce good, but often also produce bad effects, are exactly in the moral world what storms are in nature: and, as winter and frosts are sources of fertility, so are afflictions and sufferings the means to attain wisdom and virtue. Darkness teaches us the value of light. A continual light would dazzle and fatigue the sight. A serene day never gives us so much pleasure, as when it has been preceded by dark and cloudy weather. In the same manner, we should be less sensible of the blessing of health, were we not taught to feel it by the painful effects of sickness. After all, it is certain, that we in general are too much inclined to exaggerate our evils. The events and accidents that happen to us are seldom as melancholy as we imagine. Our self-love, our pride, and our excess of delicacy, blind us often to such a degree, that we look on every thing that happens to us as real and great evils; while, on the contrary, we take no notice of our real advantages, and the sweets which attend us. It is at least certain, that all our troubles ought to be reckoned as nothing, in comparison of the multitude of blessings and pleasures that are bestowed upon us by Divine Providence. Those very evils, of which we complain, will prove real, though disguised blessings, if we know how to make a wise use of them; just as the snow, the storms, the frost, and other variations of the seasons, are means which God makes use of to grant us new favours. When the sky has been long dark and stormy, the clouds at length dissipate, and calm and sunshine bring back joy and gladness. The heavier the showers are, the sooner the clouds vanish. The darker they are, the sooner the rays of the sun disperse them. Misfortunes fill up but a short space of our lives, and when they appear to us the heaviest, when we seem sinking under them, it is a proof that they are soon to end.

I will accept, then, without murmuring, the crosses and disappointments it may please the Almighty to allot me. For those who sow in tears, will reap in joy. When the short miseries of life are over, I shall find how advantageous they have been to me; and I shall bless my Creator for having conducted me to heaven through paths of tribulation and sorrow.

These are the thoughts which will support me in every misfortune. As the expectation of spring makes the gloomy appearance of winter supportable, so does the sweet hopes of futurity encourage me to bear, with resignation and fortitude the present miseries. Through the darkness of this life, there opens to me the delightful prospect of a happy hereafter. What I foresee, already sheds light on the path through which I walk; and by this way I shall imperceptibly arrive at the blessed abodes of peace, light, and happiness.

LESSON XXII. EIGHTH WEEK.

AN INVITATION TO CONTEMPLATE GOD IN THE WORKS OF NATURE.

O YE who adore with me the Lord, by whom the heavens and the earth were made, come and reflect on his works! Behold the wonders he has done! Acknowledge, and have a lively sense of his mercies! Of all the knowledge we can acquire, this is the most important, the most easy and agreeable: We could dispense with many sciences which take such pains to learn; but the knowledge of God and his works is absolutely necessary, if we wish to fulfil the end of our creation, and by that means secure our happiness here and hereafter. It is the best preparation to understand, and to receive as we ought, the gospel of Jesus Christ; for this reason, because, in teaching his disciples the truths of religion, the Divine Redeemer often spoke of the works of nature, and made use of the objects which the physical and moral world afford, to lead his hearers to reflections on spiritual and heavenly things. In general, it is a noble employment, and well worthy of man, to study the book of nature continually; to learn in it the truths which may remind us of the immense greatness of the Creator, and our own littleness; his blessings, and the obligations they impose on us. It is shameful for man to be inattentive to the wonders which surround him on every side, and to be as insensible to them as the brutes are. What employment can be more pleasing to the human mind than meditations on the admirable works of the Most High! To contemplate, throughout all nature, the power, wisdom, and goodness of our Creator and Preserver! What can be conceived more delightful, than to discover in the whole creation, in all the natural world, in every thing we see, traces of the providence and tender mercies of the Father of all beings! There are no amusements, no worldly joys, of which we are not soon tired. But the pleasure we feel in contemplating the works of the Lord is a pleasure ever new. It is in this light I often represent to myself the felicity of the saints in heaven. I ardently wish to be with them, because I am persuaded it is in their society, in their blessed intercourse only, that my insatiable desire of increasing in knowledge and wisdom, is to be satisfied. But, while we are still at a distance from this happiness, let us endeavour, at least, to come as near it as possible, by habituating ourselves now to what will be hereafter, and for evermore, the employment of all good men. Let us admire the power and wisdom of the Creator in each of his creatures. This employment will make us not only happy, but virtuous: for, if we have the Most High and his works continually in our sight, with what love and veneration shall we not be penetrated? With what confidence shall we not resign ourselves to him? Every thing around us, every thing within ourselves, will serve to lead us to God, as the source of all; every thing will more and more contribute to inspire us with piety. These, O Heavenly Father! are the engagements I make before heaven and earth, in presence of every creature thou hast formed.— This sun which shines upon me, this air which I breathe, this earth which bears me, and gives me food; all nature, so wisely framed for our wants and pleasures, shall one day rise as witnesses against me, if I neglect to contemplate and admire thy works.

LESSON XXIII.

THE STATE OF SOME ANIMALS DURING WINTER.

WE do not yet see any of those millions of insects and birds, which, during summer, are in the air, in the water, and on the earth. At the approach of winter they disappear from our countries, where the climate does not agree with them, and where they can no longer find food. The first stormy day is a signal to them to rest from their labour, to put an end to their active life, and to quit their homes. We mistake if we believe that winter destroys those animals: they continue to live even in that season of the year. Providence so provides, that none of them perish. The body of some animals is formed in such a manner, that the same causes which deprive them of food, make such revolutions in them as prevent their requiring any. The cold numbs them, they fall into a sound sleep, which lasts till the return of heat opens the earth, causes their necessary food to spring up, and wakens them from their heaviness. These animals hide themselves in the sand, in pits, or hollow places, in the bottom of ponds, or marshes, where they cannot be found out or disturbed. Their state is a kind of death, or rather a swoon; and they do not revive till the gentle warmth of spring penetrates to their retreats. Some sorts of birds, at the approach of winter, undertake long journeys, to seek in other climates a more temperate air and proper food. Some fly in numbers from one country to another. Several go to Africa, crossing the Mediterranean, and return the following spring to our countries.

Lord, how admirable is thy wisdom! How tender and beneficent thy mercies to the least of thy creatures. Thou hast impressed upon the minds of some animals that wonderful instinct, which warns them of the day in which they should abandon their summer habitations, in order to pass their winter in another climate. Thou hast pointed out to others, the places where they may pass in safety their night of winter in a sound sleep. Thou revivest them again when the season of their new life arrives: Every time I reflect on these changes, they lead me naturally to think of what will happen to myself at my death; for my state, in some measure, resembles that of these birds. At the end of my life I shall also quit my home, my pleasures, and my companions, to go into a better world. I shall also rest and sleep some time, but at the moment of the new creation I shall awake; and, clothed with the strength and beauty of youth, I shall begin a life that will be eternal. What happens to animals affords me also another edifying reflection: I see from thence that Providence watches over the very smallest link of the immense chain of beings. I discover with what fatherly goodness it provides for the preservation of the weakest and lowest of creatures, in situations wherein it would appear impossible to mere human wisdom.—Would it not then be doing injustice to the wisdom and kindness of my Creator, to doubt his care of me, and to give myself up to trouble and anxiety about my subsistence? Certainly, that God who gives to insects and to birds their food in due season; who provides them retreats, and places of rest in pits and rocks; who directs them to find their food in different countries; will take care of me in time of need and distress.

LESSON XXIV.

THE AURORA BOREALIS.

WE may often see in winter, towards the spring, a sort of transparent, bright, and variegated clouds in the sky. From the north there appears a splendid light, which comes close to the other clouds. Lastly, from these northern clouds, there dart white rays of light, which reach to the centre of the heavens. This ethereal phenomenon, called Northern Lights, or Aurora Borealis, is still in some respects, one of those natural effects, the cause of which cannot be very exactly determined. Some naturalists suppose it to be a magnetic substance, which, accumulating and thickening towards the north, may shed a certain light at a distance. Others think, what is more probable, that the Aurora Borealis is occasioned by nitrous and frozen particles, which, rising in the air, and joined to the vapours, and to the fat and oily exhalations sent forth by the whales, and

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other immense fishes, which abound in the north, are lighted up, and made brilliant by that light which the Laplanders almost continually enjoy. Lastly, some philosophers pretend, that this phenomenon is only the atmosphere inflamed, and a storm not yet come to maturity. The uncertainty in which the best informed and most learned men are, in respect to this phenomenon, is very instructive to us. How many things do we see in the air, in the sky, and upon earth, which are still mysteries, even to the very best naturalists? These phenomena ought to humble the human mind, whose pride and vain curiosity often prevent its acknowledging how limited its faculties are. Many inconsiderable things confound the most learned in their meditations, and escape our enquiries: and there are a number of objects, which, indeed, we acknowledge to be planned with much wisdom, and to be very useful; but few of us can discover their true principles, their purpose, or their connexion with the natural world and its several parts. However, this ignorance does not affect our happiness; and, after all,—uninformed as we may be on this point, and a number of others, we know, at least, that every phenomenon of the physical and intellectual world happens only by the will of an allwise, almighty, and perfect Being, who directs them for the good of the universe. We have no occasion to know more in a life so short as ours; and this is doubtless sufficient to induce us to adore and bless him, who is the author of things so wonderful, and so much above our comprehension.

I find, in the mild and majestic splendour of the light from the Aurora Borealis*, a sign of the power and goodness of Providence. I behold those celestial lights without fear; because I know that the Lord of heaven has not created any thing to be a torment and misfortune to his creatures. And perhaps there are people in the northern countries who draw great advantages from these phenomena, though they so little influence ours.

LESSON XXV. NINTH WEEK.

THE EXTREME SMALLNESS OF CERTAIN BODIES.

THE vaulted sky, the depths of space, and its unlimited extent, those vast bodies which shine in the firmament, the variety of creatures which cover our globe, and which fill the air and the water, all these declare the Glory of the Mighty God, and tell us his power is infinite. But it must not be supposed, that the power and wisdom of the Creator is only visible in the immense size of the world. Even in the smallest objects, in the most inconsiderable parts of the natural world, the greatest subjects of admiration are to be found.

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* When these lights were first observed in Europe, in the 18th century, whole nations of the superstitious and ignorant were thrown into consternation and terror; they imagined that they saw whole armies in motion, and battles fought in the air. Indeed some pretended to foretel events by them, threatening the people with war, famine, or pestilence.

The construction of a grain of sand, seen through a glass which greatly magnifies every object, is sufficient to fill the mind with astonishment. Who indeed would not be surprised to learn, that there is sometimes an insect living in the midst of a grain of sand which the eye can scarcely discover? Examine also with a microscope (which magnifies some millions of times) the mouldy appearance on a piece of bread; and you will see in it a thick forest of fruit trees, the branches, leaves, and fruit of which are easy to be distinguished. But even in our own bodies we may perceive objects of inconceivable smallness, which perhaps we have not yet taken notice of, and yet deserve all our admiration. They are covered with an innumerable multitude of pores, of which the naked eye can only distinguish a small part. The epidermis, or skin, resembles the scale of a fish; it has been calculated, that a grain of sand would cover 250 of those scales, and that one single scale would cover 500 of those interstices, or those pores which give passage to the insensible perspiration.

Have you ever reflected on the wonderful construction of the hairs of your head? as inconsiderable as they appear, they are one of the Creator's master-pieces. They are hollow tubes, each of which has its root, a substance full of marrow, and several little threads which unite them! In that whitish matter, or scale, which our food leaves upon the teeth, and which settles there, (by means of a microscope magnifying one million of times) a great number of little animals have been discovered; and it has been found, that in a space, not larger than a grain of gunpowder, there was a million of those animalcula.

Are not these so many circumstances that ought to make us humble in our own eyes, and raise our ideas of the Supreme Being? There are, perhaps, a multitude of wonders in our own bodies, which no one has thought of or suspected. How many imperceptible objects may there not be in nature, out of the reach of the microscope, and of our understanding? But the little we know, is more than sufficient to convince us, that it is the Lord who hath made even the most diminutive creature upon earth.

LESSON XXVI.

THE HOPE OF SPRING.

EVERY day draws us nearer to the pleasures of spring, and gives us hope of the time approaching, in which we may breathe more freely, and contemplate nature with more satisfaction and joy. This sweet expectation is almost the only one which does not deceive us, being founded on the invariable laws of nature. The charms of this hope are felt in every heart without distinction; for the beggar, as well as the monarch, may behold the spring approach with pure joy, and promise himself sure pleasure in it. This hope is not attended with impatience, because it extends very far, and takes in a multitude of objects.—The coming of spring procures us many new pleasures: the beauty and perfume of the flowers; the singing of the birds; and every where the cheerful prospect of mirth and pleasure. Most earthly hopes are attended with anxieties; but that of spring is as satisfactory as it is innocent and pure; for nature seldom deceives us. On the contrary, her presents generally surpass our expectations, both in number and quantity. It is a great blessing of Providence, that in all the changes of seasons, and the vicissitudes of life, we can still nourish hope in our hearts. Winter would have been infinitely more melancholy without this comfortable prospect. Encouraged by the hope of spring, we have patiently borne the inconvenience of cold and bad weather, and are now on the point of seeing that hope abundantly realized. A few more disagreeable days, and the sky will become serene, the air milder; the sun will revive nature, and the earth will reassume its ornaments.

We ought to return thanks for these sources of joy and comfort which are opened to us, to soften the evils of life. Without hope, the earth would be a vale of misery, and our lives a series of sorrow and pain. But hope is given to us, as an agreeable companion through our pilgrimage. When all around us is gloomy, it opens for us a cheerful prospect of futurity, which revives, and enables us to walk with content through the sorrowful paths of life. What words, indeed, can express the great hopes I may indulge as a Christian! which has entitled me to expect a felicity, not confined within the narrow limits of this life. What matter how long and severe the winter of our lives? Let us hope for spring. Let us await the renewal and perfection of existence in the world to come.

LESSON XXVII.

VARIETY OF MEANS WHICH CONTRIBUTE TO THE FERTILITY OF NATURE.

THE wisdom of Providence makes use of several means to render the natural world fruitful. Sometimes the clouds fall in rain, in order to purify the air from hurtful vapours, to soften the earth, and fill it with nourishing juices. At other times, when the earth is deprived of the blessings of rain, a soft dew frequently moistens and renders fruitful such plants as appear ready to wither. The snow, which in winter covered our fields and meadows, not only served to guard the earth from the severe cold; but, by means of the salts with which it is mixed, contributed also to the fertility of the land. The frequent storms that are felt in spring preserve the air from corruption, dry the earth, and disperse the rain over the whole surface of the globe. What benign influence have they also upon the earth in making it fruitful; with every thunder shower the Creator spreads his precious blessings on the earth. One may, without extravagance, maintain with certainty, that there is no revolution in the air, or on the earth, which does not, directly or indirectly, contribute to the fertility of our globe. Each season brings back the phenomena peculiar to it; and each phenomenon of nature produces effects, the happy influence of which is more or less visible. Even those visitations which cause great destruction in certain countries are only particular evils, which contribute to fulfil beneficent views, as there result from them advantages to the world, when considered in the whole.

In all times and places, let us acknowledge the tender care of our beneficent Creator! Our globe, continually rolling in the starry space, is sometimes sown with flowers, at others covered with snow; here adorned with vines, there crowned with ears of waving corn:—It sings continual praises, and uniting with the harmony of the spheres, declares the power and goodness of the great Creator. When the snow and ice change our fields into desarts; when the tempest roars in the winds; when the lightning and thunder make mortals tremble; when the rivers, leaving their beds, overflow whole countries; when all the elements seem to conspire the destruction of the world; it is *then* that the return of spring prepares for the inhabitants of the earth, health, joy, peace, and plenty.

In order to lead mankind to a sense of their destination, to a horror of sin, and to the practice of virtue, the Almighty sometimes makes use of violent, and at others of mild methods. Sometimes he thinks proper to punish the sinner severely, to lay heavy judgments, and of a long duration, upon him, in order to awaken him from his slumber. He speaks to hardened hearts, as to the Israelites on Mount Sinai, with lightnings and with a voice of thunder. With others he makes use of opposite measures: he endeavours to snatch them from vice and vanity, and to draw them to him by the gentle ways of blessings and goodness.

LESSON XXVIII. TENTH WEEK.

THE DIFFERENCE BETWEEN ANIMALS AND PLANTS.

THE difference between animals and plants is so great, and so visible, that it requires but a very slight observation to be convinced of it. Undoubtedly, one remarkable difference consists in the animals having the faculty of moving and changing place, a faculty of which the vegetables are totally deprived. A much more essential difference is the faculty of feeling, which cannot be denied to animals, while it cannot be granted to plants. To this must be added, the manner of being nourished, which is still another distinction between them: animals, by means of exterior organs, are capable of choosing their proper food; plants, on the contrary, are obliged to take what nourishment the earth affords without any choice. This is given them from the moisture of the earth, and by the action of the veins in the leaves, which pump and draw in the nourishing juices with which the air is filled. The number of species is much greater in the animal than in the vegetable kingdom.—In the insects alone, there may, perhaps, be a greater number of classes (taking in those which can only be seen with a microscope) than there are of visible plants on the surface of the globe; neither have the animals such conformity with each other as the plants have, whose resemblance makes it difficult to class them. Who can avoid observing another remarkable difference, as to the place where they live? The earth is the only place where plants can grow and multiply; most of them rise above its surface, and are fastened to the soil by roots more or less strong; others are entirely under ground. A small number grow in the water; but, in order to live, it is necessary they should take root in the earth. Animals, on the contrary, are less limited in place. An innumerable multitude people the surface and the interior parts of the earth. Some inhabit the bottom of the sea; others live in the waters at a considerable depth. Many live in the air, in vegetables, in the bodies of men and animals, in fluid matter, and also in stones. If we consider animals and plants, in respect to size, we shall find still a striking difference. Between the size of a whale and that of a mite, the distinction is much greater, than between the highest oak and a piece of moss. Lastly, it is particularly in the form of animals and plants, that the general and most striking difference subsists. Most of the latter have, in that respect, so distinct a character, that it is impossible to confound them with vegetables. However, let us not imagine we have perfectly discovered the limits which divide the animal from the vegetable kingdom, or, that we have found out all that distinguishes them. Nature, to diversify her works, makes use of almost imperceptible shades. In the chain of beings, perfection increases successively, and rises by millions of degrees, so that a more perfect species differs very little from that which immediately preceded it. How narrow are the bounds which separate the plant from the animal! There are plants which appear sensible, and animals which seem deprived of sensation.

Nothing proves this better than the discoveries made in coral. Formerly, it was supposed that corals were sea plants, but now, there are strong reasons for placing them among animals; for, what was then taken for a flower, has proved to be really an animal. The more observations are made, the more reason is there to be convinced, that it is impossible to fix the exact limits of the three kingdoms, the mineral, the vegetable, and animal; and that amongst most creatures there is more conformity than dissimilarity. It is at least certain, that the limits which divide the most perfect creatures, from those that are a degree less so, become at last imperceptible to understandings so limited as ours. These observations ought to convince us that the world, with all the creatures it contains, is the work of an Infinite Being. So much harmony and such differences, so much variety with so much uniformity, can only proceed from the almighty, omniscient, and perfect Being, who created the universe and all that is in it. Let our hearts rise towards him. If we go from the stone to the plant, from the plant to the brute, from the brute to the man, and from man to heavenly spirits; when we consider his works, they appear to be so immensely great and numerous, that we cannot comprehend the whole of them. Therefore, the less capable we are of conceiving how far the wisdom of God extends, the more we ought to reflect on his greatness! and, above all, to imitate his goodness as much as is in our power. We see that no creature is deprived of the merciful care of the Lord. It is extended to the stone and the plant, as well as to men and animals. In his sight there is no distinction: his mercy is over all his works. Let us, in this also, endeavour to imitate our Maker. We fill, it is true, a distinguished rank among created beings; but, let us take care not to be cruel or tyrannical towards creatures who appear to be inferior to us. Let us rather endeavour to enjoy, with gratitude and moderation, all those designed by God for our use.

LESSON XXIX.

THE UNIFORMITY AND VARIETY IN THE WORKS OF NATURE.

THE sky over our heads, and the earth under our feet, remain always the same from age to age; and yet they afford us, now and then, spectacles as varied as they are magnificent. Sometimes the sky is covered with clouds, sometimes serene, at other times blue, or of different colours. The darkness of night, and the light of noon-day, the dazzling light of the sun, and the paler light of the moon, succeed each other regularly. The immeasurable space of the heavens appears sometimes a desart, and sometimes strewed with an infinite number of stars. To how many changes and revolutions also is our earth subject! For some months uniform, and without ornaments, the severity of the winter robbed it of its beauty; the spring renews its youth; summer will show it still more rich and beautiful; and, in some months after, autumn will pour upon us every

sort of fruit.—What variety also on our gl
between one country and another! Here a
level country presents us plains beyond the
mits of sight; there high mountains rise crow
ed with forests; at their feet fertile valleys
watered with brooks and rivers. Here gul
and precipices; there still lakes; and furt
off impetuous torrents. On every side is se
a variety which pleases the eye, and opens
heart to sensations of pure and sweet delig
This same assemblage of uniformity and vari
is found in all the vegetables on our glo
They take from their common mother all
same nature, and the same food: they have
the same manner of springing up and growi
yet, what a prodigious difference between
blade of grass and an oak! all together
ranged under certain classes. Those of
same species are indeed very like one anoth
and yet what differences we see in them! I
the same in respect to animals. The wisd
of the Creator has divided them also into class
and whatever variety there is in them, they
preserve essential resemblances.—There is e
a certain degree of conformity between
and the lowest class of animals. However
perior man may be to animals in many respe
has he not in common with them, and e
with plants, the same means of food? Is it
the sun, the air, the earth, and water, w
provide it for them all alike? The plants g
ripen, fade, and die; and those laws of na
extend to animals, and even to mankind.

If we next examine the variety of the hu
species, what an astonishing assemblage of
formity and diversity! Human nature, i
times, and among all people, is ever the s

and yet we find, that of all this innumerable multitude of men spread over the earth, each individual has a form peculiar to himself; particular talents and countenance, which, to a certain degree, serve to distinguish him from any other.—It seems as if the wisdom of the Creator chose to vary, in the highest degree, all his works, as far as was compatible with the essential construction peculiar to each species. All the creatures on our globe are divided into three classes, minerals, vegetables, and animals, These classes divide into kinds; the kinds into numberless sorts of individuals. From whence it is, that there is no creature on earth alone, or without resemblance to its own species. There is no species which has not some connexion with others, or a general affinity with the rest of the world. From this assemblage of uniformity and diversity, (which is of infinite extent) is derived the order and beauty of the universe.—The difference observable in the various countries of our globe, proves the wisdom of the Most High, who chose that each being should have its certain place, and has so wisely ordered the whole, that it would be impossible to change the connexion or distinction he has made between them: for, even the minutest works of nature, such as only can be seen through a microscope, discover such union and variety together, as must necessarily raise our souls to the contemplation of the infinite wisdom of the Creator.

LESSON XXX.

SEEDS.

ALL vegetables spring from seeds; but the greater number of these are not sown, and are even invisible to us. It is nature that disperses them. With this view she has furnished some seeds with a sort of light down, or little feathers, which serve as wings for the wind to carry them away, and spread them every where. Other seeds are small and heavy enough to fall perpendicularly on the earth, and to sink of themselves into it. Others of a larger or lighter sort, which might be carried away by the wind, have one or more little hooks to catch, and prevent them from going too far from their place. And what is still more admirable, is, that nature seems to have given to some birds the care of planting trees: they gather gooseberries, currants, cherries, nuts, and various kinds of fruit, and carrying them to a place of security for food, some of them are scattered on the earth, where they shoot, take root, and become fruit-bearing bushes or trees. Ravens have been thus seen to plant oaks; and this is their method: they make a hole in the ground with their bill, and drop an acorn into it, which they afterwards cover with earth and moss. It must not be supposed they do all this with an intention to plant trees; it is instinct alone which prompts them. They bury the acorn for their food,—it shoots, and becomes an oak. If the sowing of seeds in meadows and forests had been entirely left to mankind, how insufficient would have been the means!

Observe, how, at the return of spring, the grass and flowers shoot up and adorn the earth, without our having in any degree contributed towards it. But this is not all that is to be admired in respect to seeds. It is remarkable that the whole plant, however great it may be, is all concealed in the narrow space of the seed. The whole trunk of the oak, its leaves, branches, and roots, are already in the acorn.

The plants which remain all the year in the ground, how carefully are their blossoms and seeds enclosed during winter in the buds, where they are well protected, and covered with close coats of curious texture. As for those plants which cannot bear the cold of winter, they are preserved under ground by their roots or fruits, till the mild warmth of spring makes them bud again. Some seeds are lodged in the middle of the fruit; others in pods and shells. But every seed is protected and preserved in the manner most suitable to its nature. Every where we may trace the Divine Creator.

LESSON XXXI. ELEVENTH WEEK.

USE OF VEGETABLES.

WHEN I consider the great number and variety of vegetables, I discover in this circumstance, as in every thing else, the beneficient views of my Creator. What, indeed, could he propose, by covering the earth with so many different herbs, plants, and fruits, but the advantage and happiness of his creatures? There are so great a number, and such variety of plants, that they already reckon above thirty thousand species of them; and every day there are new species and new classes found. Their increase is infinite. For example, who would not be astonished, that a single grain of wheat should produce two thousand others, and that a single seed of poppy should multiply to such a degree, that in two or three years a whole field might be sown with it. Can we suppose, that the Almighty had not the advantage of his creatures in view, when he ordained this prodigious increase of plants. There can remain no doubt of his intention, if we consider the use made of vegetables from the remotest times. Do not plants and fruit furnish us every day with the most wholesome and nourishing food? Do we not mostly owe our clothes, houses, and furniture, to the vegetable world? There is no part of plants that has not its use. The roots furnish medicaments; they serve for food and fuel, to make pitch, dyes, and all sorts of utensils. Of wood, they make coal, buildings, fires, medicines, paper, dyes, and a vast numbor of instruments. The bark even has its utility in medicine, in tanning, &c. The ashes serve to manure and improve the ground, to bleach cloth, to make salt-petre; and they make use of pot-ashes in dying. Rosin is useful in many manufactures, pitch and tar are made of it. They make use of turpentine, gums and mastic in medicine; and for perfumes.

Flowers please and delight, both by their colour and smell. They serve as medicines, and are particularly useful in furnishing bees with wax and honey. The fruits, which ripen by degrees, serve for our food, and are eaten either raw, baked, dried, or preserved.

But vegetables are not for the use of man alone; they are of still greater use to animals, most of which have no other food. The reason there are so many fields, and so great variety of herbs and plants, is, that all the different animals may find their proper food.

Who can reckon all the blessings the vegetable world affords us? It is at least manifest, that all the arrangements made, in this respect, tend to the use of all creatures. There is not a plant upon earth that has not its purpose and use. What sentiments, therefore, of gratitude and veneration ought we not to feel, at the sight of a country, a meadow, or a field.

LESSON XXXII.

THE CHANGE OF SEASON.

IN the warmest, as well as in the coldest climates, there are but two seasons of the year really different. The coldest countries have summer about four months; during which the heat is very great, occasioned by the length of the days. Their winter lasts eight months. Spring and autumn are scarce perceptible there; because, in a very few days, an extreme heat succeeds an extreme cold; and, on the contrary, the great heats are immediately followed by the most severe cold. The hottest countries have a dry and burning season for seven or eight months. Afterwards comes rain, which lasts four or five months; and this rainy season makes the difference between the summer and winter. It is only in temperate climates, that there are four seasons really different in the year. The summer heats gradually decrease, so that the autumnal fruits have time to ripen by degrees, without being hurt by the cold of winter. In the same manner in spring, the plants have time to shoot, and grow insensibly, without being destroyed by late frosts, or too much hastened by early heats. In Europe, these four seasons are most perceptible; and particularly in Italy and in the south of France. By degrees, as we advance towards the north, or towards the south, the spring and autumn are less marked. From the middle of May to St. John's-day, it rains less frequently; after which, the violent rains return, and continue to the end of July. The months of February and April are generally very uncertain weather. If the melted snow and rains remained on the ground, without falling away or evaporating, the water would annually rise to the height of a foot and three quarters in most countries. This change of seasons deserves our admiration. It cannot be attributed to chance; for in fortuitous events there can neither be order nor constancy. Now, in every country throughout the world, the seasons succeed each other with the same regularity as the nights and days, and change the appearance of the earth precisely at the appointed time. We see it successively adorned, with herbs, and leaves, with flowers, and with fruit. Afterwards it is stripped of all its ornaments, till spring returns, which, in some degree, revives it. Spring, summer, and autumn, provide food for men and animals, in giving them abundance of fruits. And though nature appears dead in winter, that season is not without its blessings;

for it moistens and fertilizes the earth, and, by that preparation, makes it fit to produce plants and fruits in due season.

It is now that charming season begins again, which opens such an agreeable prospect before us, and makes amends for the dreary winter days that are past. The spring approaches every day, and brings with it innumerable pleasures and blessings. How many have wished to live to see the renewal of nature, and to recover, in the fine days of spring, from all they had suffered during winter. But they have not had the consolation to see this day, and their lives were ended before the winter was over. More favoured than many millions of my fellow-creatures, who have been carried off by death, I still live, and may indulge the joy with which spring inspires me. But how often have I seen this season, without thinking of the goodness of my Creator, without opening my heart to gratitude and love! And perhaps this is the last spring I shall see upon earth. Perhaps, before the equinox returns, I shall be in my grave. Let this thought lead me to feel so much the more sensibly the happiness granted me, and to redeem, with more care, every moment of this transitory life.

LESSON XXXIII.

HARMONY BETWEEN THE MORAL AND NATURAL WORLD.

THE wisdom of the Deity has created so great an affinity between the world and its inhabitants, as to show that the one was manifestly made for the other: there is a connexion and perfect harmony in all his works. Human nature and the surface of the earth have very near relations to each other, and a striking analogy. As the bodies of plants and animals form, grow, arrive at maturity, and perish; so are men subservient also to this law of nature. As there is a great diversity of climates and soils, some barren, and others fruitful; so is there an equal variety in the minds, talents, and faculties of men. Such has been the plan of the Creator; and there is in this variety more goodness and wisdom than we think of at first sight. Far from appearing defective, we should find it all perfection, if we had a thorough knowledge of things. If any body was tempted to object to God's not having given the same faculties, the same degree of understanding to all mankind; we might answer, Who art thou, blind and weak mortal, that darest to question the Almighty on what he has done? Shall the creature say to the Creator, Why hast thou made me thus? We might as well ask, Why God has not ordained that all the kingdoms and countries on earth should be equally agreeable and fruitful? Why in certain places the soil is rich and fertile, while in others it is so barren and ungrateful, that all attempts to improve it are thrown away! Let us not doubt that this difference is very right, and worthy our admiration, though it is not always conformable to our way of thinking. The most barren and desart countries have their use and beauty in the eyes of the Creator. It is the same in respect to the most savage and uncultivated nations. All hold their proper place in the immensity of created beings; and their variety serves to declare the wisdom of God, which is infinite. But, as it is evidently the intention of Divine Providence, that the earth should be cultivated, and produce abundance of fruits, for the preservation of men and animals, as it is for the same purpose that God has given us the corn to sow in the ground; so also, and with more reason, does his wisdom require, that human nature should be cultivated; and that our souls should be made fruitful, and enabled to reap the excellent harvest of virtue and piety. It is with that design that he has given to mankind lessons of true religion; which, if they find a soil well disposed to receive them, produce exquisite fruit, like the corn which is sown in fertile ground. From thence it is, that the gospel also can have no efficacy in the world, but in proportion to the natural faculties of men, and the dispositions with which they receive it.

There are still in our days, vast countries, barren and uncultivated, although Providence denies them nothing that they require to make them fruitful. It is thus that, notwithstanding the publication of the gospel, there are still so many people who remain in ignorance. Even among the most polished nations of Christianity, the efficacy of the gospel is unequal, and will ever be so, according to the diversity of characters to whom it is made known. Some do not comprehend it, and have no sense of the salutary effects of the truths of our holy religion. Others receive those truths with eagerness and joy, but those impressions do not last. With others, the passions and cares of the world stifle the divine word. And some receive it with an honest and upright heart, with wisdom, with conviction, and sincerity. It is for them alone, that it becomes "the power of God unto salvation."

But to which of these do I belong? What impression has the doctrine of salvation made upon my soul? What fruit has the good seed of the gospel produced in my heart? These are questions which my conscience ought to answer honestly and sincerely; but of which my conduct through life will be the best proof.

LESSON XXXIV. TWELFTH WEEK.

THERE IS NOTHING NEW UNDER THE SUN.

IT is certain that, in respect to us, there happens many new things upon earth. Nature causes new flowers to blow every season, and other fruits to ripen. The scene of nature changes every year. Each day brings new events and new revolutions. The situations of objects change daily, or rather present themselves to our senses under different forms. But it is only relatively to our limited understandings and knowledge, that it can really be said, there is any new thing under the sun. Nothing is more certain than the saying of Solomon, that, "What has been will be, and what has been done will be done, and there is nothing new under the sun." The Deity, whose wisdom is infinite, has not thought proper to multiply beings unnecessarily. There are as many as our wants, our pleasure, or our curiosity require. We cannot even gain a superficial knowledge of all the works of our Creator; much less are we able to exhaust them. Our understandings are too weak to conceive a just and perfect idea of all created beings. We therefore sometimes imagine there are many new things under the sun; for, as the whole creation is immense, and as we cannot take in all the parts of it at once, we fancy, that each point of view we see it in for the first time, is new, because the Creator has, in every part of the world, made a wonderful variety and diversity. The world does not require a continued creation to extend to infinity. It is enough that the Being of beings should maintain the order he has established from the beginning. God is an artist who requires but a small number of springs to vary the works he has produced; and which are, however, so varied, and in so great a number, that, though they succeed one another, and return with the greatest regularity, they appear to us ever new. Let us be content to enjoy with gratitude the things he has created, without undertaking to sound the depths of them, or attempting to take in their vast extent. The impossibility of our reckoning all the works of the creation, is, in some sort, the seal by which we may conclude, that the world is the work of a God; and it is, at the same time, a certain proof of the weakness of our understandings. But have there not been discoveries made lately, which were formerly entirely unknown? Do not all the kingdoms of nature now present phenomena to us that we had no idea of formerly. The most of these discoveries we owe less to our sagacity than to our wants. In proportion as these multiplied, new means were necessary to supply them, and Providence deigned to furnish us with those. But the means existed before we discovered them. The minerals, plants, and animals, which we have lately learned to know, existed in the bosom of the earth, or on its surface, before the enquiries and labour of man had made them visible to us. It is certain, even, that many of the discoveries we boast the most of, were made by the ancients! If the world was the work of chance, we should now and then see new productions: why then do we not see new kinds of animals, plants, and stones? It is because all has been planned by the infinite wisdom of the Supreme Being. All that he does is perfect; it does not require to be renewed or created again; there is sufficient for our convenience and use. Nothing was made by chance: All events have been determined by Infinite Wisdom, and are linked together in one chain. The whole fabric of the world is preserved by the providence of its Creator, and by the concurrence of laws both general and particular.

LESSON XXXV.

CIRCULATION OF THE SAP IN TREES.

THE trees, which for several months appeared quite dead, begin insensibly to revive. Some weeks hence we shall discover in them still more signs of life. In a short time the buds will grow larger, open, and produce their precious blossoms. We have it always in our power to observe this revolution regularly in the beginning of each spring; but perhaps have been hitherto ignorant by what means it operates. The effects we observe in spring, in trees, and other vegetables, are produced by the sap, which is put in motion in the stalks of the trees, by the air and increase in heat. As the life of animals depends on the circulation of their blood, so also the life and growth of plants and trees depend on the circulation of sap. For this purpose, God has formed and disposed all parts of vegetables, so as to concur towards the preparation, preservation, and circulation of this nourishing juice. It is chiefly by means of the bark, that the sap in spring rises from the roots into the bodies of trees; and even conveys, throughout the year, all the nourishment to the branches and fruit. The wood of the tree is composed of small long fibres, which extend in a direct line the whole length of the tree to the top; and which are very closely joined together. Among those fibres there are some so small and fine, that one of them, though scarcely so thick as a hair, contains more than eight thousand little fibres. There are a multitude of little veins to contain the nourishing juice, and to make the circulation easy. These veins extend to the other branches, and rise up the whole length of the tree to the top; some conduct the sap from the root to the top of the tree, and others bring it down from the top to the bottom. The sap rises up the ascending veins in the heat of the day, and comes down the other in the cool of the evening. The leaves serve for the same purpose, and their chief use is to make the sap circulate; not only that which proceeds from the root, but also what the tree receives outwardly by means of dew, the moisture of the air, and rain. The nourishing juice is spread through every part of the tree. But it could not rise through the stalks, if there were not openings in them at the top. It is through these pores that the watery parts of the sap evaporate, while the oily, sulphureous, and earthy parts mix together to nourish the tree, to transform into a substance, and give it a new growth. If the juice should not reach it, if the circulation be stopped, if the interior organization of the tree be destroyed, whether by too severe cold or frost, by age, or by any wound or outward accident, the tree dies.

After these reflections, can we see with the same indifference as formerly, the trees at the season of spring? Will the expected change in them appear so little worth our notice? And, can we observe the renewal of all nature, without thinking of Him who gave life to every creature; who provides the juices analogous to trees; who communicates to that sap the power of circulating through the veins, and from thence of giving to trees life, nourishment, and growth: alas! that it should be possible to see all these things every year, without giving proper attention to them: it is what I am too strong a proof of. At the return of many springs, I have had the opportunity to observe this quickening virtue which appears in plants and trees; but I have thought no more about it than the animals which graze in the field; and, what is still more wonderful, I have been equally inattentive to the preservation of my own life, the growth of my body, and the circulation of my blood. Grant that I may now, at least, as I have the happiness to see the spring again, think in a more reasonable way, and more as a Christian.

LESSON XXXVI.

OUR IGNORANCE OF OUR FUTURE STATE.

IF we are ignorant of future events, we must not seek the cause of it merely in the nature of our souls, the faculties and knowledge of which are very limited; but also in the express and infinitely wise will of the Creator.

Knowledge is to the soul what the light of the sun is to the eyes: a too great splendour would hurt, without being of use. It would be very dangerous to the virtue of man, if he had the faculty of foreseeing what was to happen to him; for outward circumstances have generally some influence on the way of thinking, and in the resolutions we form: therefore, the more we know of future events, and the many temptations we have to surmount, the more we should have to fear for our virtue. How wretched also should we be, if we could see into futurity. Suppose, in reality, that the future events were to be agreeable and happy: while we do not foresee this greater happiness which awaits us, we enjoy with gratitude the present advantages we possess. But draw the curtain, and discover an agreeable prospect of futurity, and we cease from that moment to enjoy the present. We should no longer be content, happy, or grateful. We should anxiously and impatiently expect the fortune designed us; and our days would pass one after another without enjoying them. But suppose future events are to be sad and melancholy, we suffer before-hand all the afflictions as soon as we foresee them. Days which might have passed agreeably, in peace and quiet, if the future had been concealed from us, are, as soon as we know it, spent in anxiety, in sorrow. How great, therefore, is the wisdom and goodness of the Almighty, in having thrown a veil over futurity, and only letting us know our fate by degrees, as the events happens to us! Let us never wish to anticipate the happiness which awaits us, nor to feel the weight of evils before they happen. Let us, on the contrary, every time we think on futurity, bless our Creator for having, by this ignorance, spared us so many cares, fears, and sorrows. When we lie down to sleep, let us recommend ourselves to His care without troubling ourselves about what may happen in the night; and when we awake, let us trust in him, without being anxious for the events which may mark the day. In the midst even of the dangers with which we are surrounded, and the misfortunes which threaten us, let us remember the goodness of God; let us put our trust in him, believing that he will either remove them, or turn them to our advantage.

LESSON XXXVII. THIRTEENTH WEEK.

PATERNAL CARES OF PROVIDENCE FOR THE PRESERVATION OF OUR LIVES IN EVERY PART OF THE WORLD.

WE know at present a great part of our globe, and new regions of it are still discovered from time to time. But no place has yet been found, where nature did not produce some of the necessaries of life. We are well informed of countries where the sun burns up almost every thing; where little is to be seen but mountains and sandy desarts; where the earth is almost entirely stripped of the verdure with which it is so richly adorned in our climates. There are countries also, which are scarcely ever cheered with the rays of the sun, and where its beneficent warmth is rarely felt; where an almost continual winter benumbs every thing; where there is neither culture, fruit, nor harvest. And yet, men and animals are there, who do not fail of subsistence. The productions denied them by Providence, because they would have been burnt by the sun, or frozen by the severe cold, are supplied by gifts more suitable to those climates, and on which men and animals can feed. The inhabitants seek with care what nature has in store for them. They know how to appropriate it to their own use: and they thus procure for themselues all they require for their subsistence and convenience of life. In Lapland Providence has so contrived, that an evil, in some respects very inconvenient to the inhabitants, becomes a means of their preservation. There are an innumerable multitude of gnats, which, by their stings, are very troublesome to the Laplanders, and from which they cannot guard themselves, but by keeping up in their cottages a continnal thick smoke, and daubing their faces with pitch and tar. These insects lay their eggs on the water, and by that means draw a great number of aquatic birds, who feed on them; and being afterwards taken by the Laplanders, become themselves the chief food of those people. The Greenlanders generally prefer animal food to the vegetable; and it is true there are very few vegetables in that barren country. There are however some plants in it, which the inhabitants make great use of; such as sorrel, angelica, and particularly the spoon herb, cochlearia. But their chief food is the fish which they call angmarset. After they have dried it in the open air upon the rocks, it serves them every day instead of bread, or greens; and they preserve it for winter in great leathern sacks. In Iceland, where there is no agriculture, owing to the severe cold, the people live on dried fish, instead of bread.

The Delecarlians, who inhabit the north of Sweden, having no wheat, make bread of the bark of birch and pine, and a certain root which grows in marshes. The inhabitants of Kamschatka feed on the stalk or trunk of the bear's-foot plant, which they eat raw, after they have peeled it. In Siberia, they make use of the roots of mountain-lily.

Such are the tender mercies of Providence for our preservation, that his goodness has spread over the whole earth such food as is requisite for our subsistence! But by his wisdom, such a relation, connexion, and communication is formed between the inhabitants of the earth, that people separated from one another by vast seas, labour, notwithstanding, for one another's mutual ease and subsistence.

LESSON XXXVIII.

ABUSE OF ANIMALS.

SO improper a use is made of animals, and in so many ways, that it would be difficult to enumerate them. These abuses, however, may be confined to two chief points; that of too much, or too little value being set on them; and, in either case, we act contrary to the intention of the Creator. On one hand, we lower the brutes too much, when we assume an unlimited power over them, and think we have a right to treat them according to our caprice. All who are not corrupted by passions, or bad habits, are naturally inclined to compassionate every being that has life and feeling. This disposition undoubtedly does honour to man, and is so deeply engraved on our minds, that any one, who had rooted it out, would prove to what a degree he was degraded and fallen from the dignity of his nature. He would have but one step more to make (to refuse to man the compassion he does not grant to beasts) and he would then be a monster. Experience but too well justifies this remark, and many examples of it may be recollected. History furnishes us with them; for, those nations, where the people took pleasure in bull-baiting, distinguished themselves also in cruelty towards their fellow-creatures. So true it is, that our treatment of beasts has an influence on our moral characters, and on the gentleness of our manners. It may be said, that we have a right to destroy hurtful animals.—I confess it: but does it follow from thence, that we are authorised to take from them, without pity or regret, a life which is so dear to every creature; and that, when necessity forces us to it, we should find a barbarous pleasure in it, or think we have a right, in thus depriving them of life, to make them suffer torments, often more cruel than death itself? I grant that the Creator has given us the animals for our use and pleasure, and that they are designed, by their labour, to spare ours. But, does it follow that we must unnecessarily fatigue them, exhaust them with labour beyond their strength, refuse them sustenance merited by their services, and aggravate their sufferings by severe treatment? Surely no more need be said, in regard to this kind of abuse. But men fall sometimes into the other extreme, by setting too high a value on animals: even those of a social character, which are more connected with us, which live in our houses, which amuse, or are useful to us, inspire us often with an extravagant and ridiculous affection. I am almost ashamed to say, there are men and women extravagant enough to love those creatures to such a degree, as to sacrifice to them, without scruple, the essential duties they owe to their fellow-creatures.

Parents, and all who have the charge of children's education, or who live with them, cannot be too attentive to avoid scrupulously themselves any abuse of animals. It is the more necessary to dwell on this maxim, because in general it is much neglected; and very bad examples of this kind are given to children, which sometimes have an influence upon their whole education. No beast ought to be killed in their sight: much less should they be employed to do it. Let them be taught to treat animals, as beings which have life and feelings, and towards whom we have duties to fulfil. But, on the other hand, take great care that children do not attach themselves too much to animals, or grow passionately fond of them, as they are apt to do. In guarding carefully against children's making a bad use of animals, either way, they should also be taught to make a good use of them, that they may, from their earliest age, be accustomed to acknowledge, even in the formation of those creatures, an impression of the perfections of the Creator.

LESSON XXXIX.

REFLECTIONS ON THE SEEDS OF PLANTS.

THE vegetable kingdom, to an attentive observer of the works of God, is a school where he learns the profound wisdom, and unlimited power of that Supreme Being. Though we were to live an hundred years upon earth, and could devote every day to the particular study of one plant, there would still remain, at the end of that time, many things we either did not observe, or were not capable of perceiving. —Let us reflect on the production of plants: let us examine their interior construction, and the formation of their several parts: let us consider the simplicity and variety of them, from the blade of grass to the highest oak: let us try to learn the manner of their growth and increase, and the different uses they are of to men and animals. Each of these articles will sufficiently employ the mind, and make us sensible of the infinite power, wisdom, and goodness of the Creator. We shall every where discover with admiration, the most astonishing order, and the most excellent design. Though we were to know no more of plants, than those phenomena visible to every eye; though we were only to know that a grain of corn sown in the ground, strikes first a root down into the earth, and then shoots upward a stem, which bears blossoms, branches, leaves, and fruit; and wherein are contained the seeds of new plants: this alone would be sufficient to prove the wisdom of the Creator. Let us consider for once, with attention, all the changes which a grain of wheat goes through: we sow it in the ground at a certain time, that is all we can do. But mark the operations of nature. As soon as the earth supplies the grain with sufficient moisture, it swells and bursts open the outer coat, which had till then concealed in it the root, the stalk, and the leaves. The root pierces through, and sinks deep into the earth; and prepares nourishment for the stem, which makes efforts to rise even with the earth. When it has arrived at this, it grows by degrees till it has attained its proper height. It opens its leaves, which at first are white, then yellow, and at last tinged with green.—As soon as the outer skin is burst, and the root has shot into the earth, the stem springs up in the form of a very slender stalk; yet, weak as it appears, it is already strong enough to bear the intemperance of the seasons. By degrees it grows up, and becomes an ear of corn, the sight of which is so pleasing to mankind.

The fields of corn ought naturally to make us remember those fields where God lays up another seed. The human bodies deposited in the earth, are as seed sown, whose destination is to grow, and ripen for the harvest of eternity. We had as little reason, on looking at a grain of wheat, to expect it to produce an ear of corn (though the essential parts of it were in the grain) as we have to believe that our bodies, reduced to dust, will one day become glorified bodies.

The time will come, when the seed will burst forth. My dust will be raised again, and my soul rest, after the labours of this life, in the bosom of my God. The eye hath not seen, neither hath the ear heard, any thing on earth equal to such salvation.

LESSON XL. FOURTEENTH WEEK.

USE AND NECESSITY OF AIR.

AIR is the element to which all this lower world owes its life, beauty, and preservation. All the changes we observe in the different beings our globe contains, depend on air. It is absolutely necessary for the preservation of animals; for most of them would die in half a minute, if they were deprived of it; and the others could not support the want of it above two days at most. Not only terrestrial creatures, and those which fill the air, require that element, but it is necessary also to the inhabitants of the water; and what is more, they require a change of fresh air as much as other animals. The birds, in order to fly, must be supported by the air; for which reason their lungs have openings, through which the air they breathe passes into the cavity of their bodies. This single circumstance discovers to us a profound sagacity; for the body of the bird being filled, and in a manner swelled by the air, becomes lighter, and more fit for flying.

Even plants, in order to vegetate and grow, require air, and have a multitude of little vessels, which serve to imbibe it, and by means of which, even the smallest particles of them are provided with all the necessary juices.—Nothing would be more easy, than to multiply proofs of the necessity of air.—Let us dwell on one single circumstance only, which demonstrates it very clearly. If there were no air, there would be no twilight before sun-rise. It would come suddenly above the horizon; would appear the same as it does towards the middle of its course, and would not vary its appearance till the instant it would vanish entirely from our sight. The sun, indeed, would strike our eyes with a bright light if there was no air; but it would resemble a great fire burning in an open country in the middle of the night. It would in some sort be day, as the sun and the objects immediately surrounding us would be visible to us; but all the rays that would fall on any bodies, at a certain distance, would reflect in a direct line, and be lost in the extent of the heavens. Therefore, while the sun would be placed directly over our heads, we might still be in a sort of night, if there was no air between that globe and us. Let us draw together all the advantages that air is of to our earth.—It is of use to the life and breathing of living beings: to the motion of winged animals, and those which swim in water; to the propagation of sounds: to hold the earth in equilibrium with the other globes; to the formation of vapours, rain, and winds. How necessary is it also to make the earth fruitful, to favour the vegetation of plants, and disperse the bad vapours which exhale from different bodies! The sun could not furnish us with either heat or light enough, if our globe was not surrounded with air. Nobody could be heard, if the air did not set the organs of speech in play; if it did not transmit sounds, and act on the organs of hearing. How innumerable, then, in all respects, are the advantages which the air and winds procure to mankind? If we accustom ourselves to contemplate, with an attentive mind, the great object of the creation, we shall be naturally led to extol the works and the blessings of God. What may often make us neglect this duty, is our casting but a superficial glance over his works; and, in enjoying his blessings, our hearts have not always been sensible how little we deserve them.

LESSON XLI.

DIFFERENT SOILS OF THE EARTH.

THE soil is not the same every where. The upper strata is generally formed of a black, moveable, rich earth, which being moistened by broken remains of plants and animal substances, becomes the nutritive support of millions of vegetables which enrich our globe. But even that strata varies in quality. It is sometimes sandy and light, at others clayey and heavy, and often moist or dry, sometimes warmer, and sometimes colder. This is the reason why some herbs and plants grow naturally in certain countries, and require art and culture in others. The variety of soil also makes vegetables of the same kind differ in quality, according to the ground where they have been planted. If all soils were alike, if all were of the same quality, we should be deprived of many vegetables; because each species requires a soil analogous to its nature: some require a dry soil, some a moist one; some require heat, others a colder soil; some grow in the shade, others in the sun; several grow in mountains, and many more in valleys. From thence it happens, that each country has a certain number of plants peculiar to it, and which do not grow in equal perfection in others. If the alder be transplanted into a sandy soil, and a willow into a rich and dry earth, it will be found, that those soils are not fit for these trees, and that it will agree with them better to plant the former near marshes, and the latter on the borders of rivers. Therefore our Creator has provided for each species, by allotting to them the soil analogous to their internal constitution. It is true, that art can sometimes force nature to produce according to pleasure: but it is seldom worth the trouble; and, in the end, nature is found to have much the advantage of all the researches and labours of art.

The same variety that is observed in the soil of our globe, is found in the characters of mankind. There are some whose hearts are so hardened, that they cannot profit by instruction. No motive can influence; no truth, however evident, can rouse them from their indolence.—This character may be compared to a stony ground, which no climate, nor the most careful cultivation, can render fruitful. A character almost as worthless, is that where levity predominates: persons of this sort, it is true, receive the salutary impressions of religion and piety, but are discouraged by the least obstacle that comes in their way; and their zeal vanishes as easily as their good resolutions. In the minds of trifling, timid, weak people, truth and virtue cannot take root, because there is no depth. They resemble light and dry soils, where nothing comes to maturity, and where every thing dries up, as soon as the heat of the sun is felt; because they do not supply the plant with the nourishing juices it requires. But how happy those characters with whom, as in a good soil, the seeds of piety ripen and produce an abundant harvest of good fruit.

On these several dispositions observable among men, depend more or less the effect of true religion upon the heart. In vain the sower sows the best seeds; if the soil has not the suitable qualities, all his care is in vain. The purity and goodness of the seed cannot supply the natural defects of the soil. For when it is so hard and close that the seed cannot enter, or so sandy that it cannot take root, or so full of stones that it is choaked up, it is impossible it should produce fruit.

To which of these do I belong? Perhaps my heart is not so hard as to resist every impression. May I be like the fruitful soil, ready to fulfil the duties of life. And, in order to bear fruit in abundance, be fruitful in good works, preserving the gifts of grace in an upright heart.

LESSON XLII.

SIZE OF OUR GLOBE.

IT is not so easy as we imagine, to be certain of the size of our earth. There is indeed but one longitude, yet there are two latitudes, north and south: both beginning at the equator. The one extends towards the north, and the other towards the south, as far as the poles, either arctic or antarctic. But no one has yet been able to go so far as either pole extends, because the mountains of ice in Greenland, and in the northern seas, have always obstructed the passage; and so have innumerable mountains and islands of ice in the southern seas. However, thanks to the geometricians, we at present know nearly the size of our globe; and, according to the most exact calculations, the surface of the earth is nine millions two hundred thousand and eighty square leagues. The water occupies two thirds of that space; so that what remains for terra firma, or land, is reduced to three millions and ninety-six thousand square leagues.

It has been calculated, that there may be at least three thousand millions of men upon the earth; but in reality, there are not more than one thousand and fourscore millions; of which we calculate in Asia, 650 millions; in Africa, 150 millions; in America, 150 millions; in Europe, 130 millions. If, then, we suppose the earth is inhabited by one thousand millions of men, or thereabouts, and that thirty-three years make a generation, it follows, that in that space of time there dies one thousand millions.

This calculation must necessarily strike us. If the mortality is so great every year, and even every hour, is it not probable that he who reflects on it, may himself be one of those which swell the list of the dead? It is at least certain, that it ought to lead us often to serious reflections. Now, at this moment, one of our fellow-creatures is going out of the world; and before this hour be passed, more than three thousand souls will have entered into eternity. What a motive for thinking often and seriously on death.

Large as this earth appears, its greatness vanishes at once, when we compare this globe to the other worlds which roll over our heads: it is in comparison of the whole universe, as a grain of sand is to the highest mountain.

But how does this thought exalt the Creator in our eyes! how inexpressible and infinite does his greatness appear! The world and all its inhabitants are before him, as a drop in the ocean, or as the light atoms which float in the air. And what am I, among these thousand millions of inhabitants of the earth!

LESSON XLIII. FIFTEENTH WEEK.

PRODUCTION OF BIRDS.

AT this season of the year, there is a revolution in nature which certainly claims our attention. It is the time the birds lay eggs, and hatch their young. This annual miracle passes in a manner before our eyes; and that it is really a wonder, which cannot be too much admired, the following reflections will convince us.—In each fruitful egg, which has not yet been sat on, there is a spot visible in the yolk. In the centre of this spot, there is a white circle, like a thin partition, which extends a little towards the top, and appears to join to some small bladders there. In the middle of this circle, there is a kind of fluid matter, wherein the embryo of the chick is seen to float. It is composed of two lines or white threads, which appear sometimes to be separated from one another at their extremity; and between which a lead-coloured fluid is perceptible. The extremity of the embryo is contained in a little bag, surrounded by a pretty large ligament; and it is there that the navel afterwards shows itself. This ligament is composed partly of a solid yellowish substance, and partly of a fluid dark substance, which is also surrounded by a white circle. This is what has been observed in the egg before it is sat upon. After it has been above twelve hours under the hen there appears in the lineaments of the embryo, which is in the middle of the little spot, a moisture that has the form of a little head, on which are seen little vesicles, that afterwards become the back bones. In thirty hours the navel appears covered with a multitude of little vessels; and eyes also are then distinguishable. The two white threads, which, in reuniting, have still left some space between them, enclose five little bags, which are the brainy substance, and the spinal marrow, which goes through to its extremity. The heart is then visible: but it has not yet been discovered, whether it is the heart or the blood that is first formed. Be that as it may, it is certain that the embryo of the chick existed before in the egg; and that, after it has been some time sat upon, they distinguish the back bones, the brain and spinal marrow, the wings, and part of the flesh, before either the heart, or the blood and vessels are perceptible. When the essential parts of the chick are thus formed, it continues to take new growth till the twentieth or twenty-first day, when it is able to break of itself the shell which had contained it.

We owe these discoveries to some great naturalists, who, with the assistance of microscopes, have observed, almost from hour to hour, the progress of the formation and the hatching of the chick. However, notwithstanding all that we have drawn from their observations, there still remain many mysteries, which may never be discovered to us. How does the embryo come into the egg? and who gave it the faculty of receiving by means of warmth (for that is all the hen communicates to it) a new life and being? What is it that puts the essential parts of the chick in motion? and what is that vivifying spirit, which, through the shell, penetrates even to the heart, and occasions its pulsation? How do birds know that their young are contained in the egg? What engages them to sit on the nest all the time necessary to hatch them? These are questions which cannot be answered in a satisfactory manner. But the little we know of the production of birds is sufficient to prove the wisdom of the Creator.

LESSON XLIV.

PERMANENCY OF CORPOREAL BEINGS.

NOTHING in nature perishes; and, from the beginning of the world, to the present moment, there has not been a grain of sand, nor an atom annihilated. The first forests, which the powerful word of God produced, were adorned with an innumerable multitude of leaves. Those fell, withered, corrupted, and ceased to be leaves; but the parts which composed them still remain. They have been converted into dust, mud, or earth; but they are not annihilated. The matter of which the first leaves and herbs were formed, subsists still at this day, and has lost nothing of its essential parts. The plants which now flourish will exist, as to their parts, as long as the world shall last. The wood we burn ceases indeed to be wood, but its parts do not cease to exist. They are dispersed into ashes, soot, and smoke, but they are not annihilated. The kingdom of nature is liable to continual change; all dissolves, and all regenerates, but nothing finally perishes. Let us not judge by appearances. When there happens any revolution, any disorder, in nature, we are apt to believe that many things are totally destroyed: it is an error.—They are only differently modified, and become materials for the composition of other beings. The water which rises in vapours does not perish; it decreases in one place to increase in another. What uninformed persons consider as total destruction, is, in reality, but a mere change of parts; and, the world, considered in the whole, is just now what it was the first day of the creation, although a multiplicity of parts which compose it, have gradually undergone very considerable alterations.

This leads me to reflect on my own body, and the change it will experience in the grave. It is true, it will entirely corrupt, but it will not be annihilated, and the essential parts which compose it will always subsist. The persuasion of this truth is sufficient to guard me against the fear of the grave and corruption, and, at the same time, to confirm the hope of a resurrection in my soul. Why then should my heart be troubled, why shudder at the thought of the grave?

The continual duration of corporeal beings may lead me to conclude, with much probability, that my soul also will be immortal. Since none of the earthly parts will be annihilated, is it to be presumed that my soul should be the only created thing that is to be destroyed? No. The whole corporeal world would sooner perish than one soul redeemed by Jesus Christ.

LESSON XLV.

PLEASING EFFECT OF THE HEAT OF THE SUN.

AT the approach of spring nature gradually recovers the life she seemed to have lost in winter. The earth is clothed with verdure. The trees are covered with blossoms. On all sides are seen new generations of insects, and other animals, entering on life, rejoicing in their existence, and endowed with a thousand different instincts. Every thing is animated and revived. And this new life, which appears in the noblest parts of nature, is produced by the return of warmth, which awakens animals and plants, and puts their renewed strength in motion. We owe this admirable revolution to the sun, which is the source of life, sensation, and joy, as its salutary and enlivening rays are spread over all nature. The seeds feel its effect, and open in the bosom of the earth. It is from thence that the plants and vegetables shoot, spring up, and grow. Its approach revives and strengthens animals. Vegetation, and every living creature that has breath, feels the benign influence of that majestic globe. How would it be, if we were deprived of the light and heat of the sun? Into what a lifeless state would most creatures fall, and how wretched and languid would such existence be? What a source of joy and gladness would the heart of man be deprived of, if he could not enjoy the rays of the rising sun, or the light of a serene day! Nothing would compensate for the loss of it. The mildest night, the gentlest artificial warmth, could not supply the place of that vivifying virtue, which the light of the sun communicates to every being, and which has a salutary effect, very different from that of earthly fire. Men and animals know and feel it. A valetudinarian, shut up warm in his room, with every possible assistance, will not gain as much strength in many weeks, as he would in a very short time from the warmth of the sun in the fine weather of spring. Plants forced in hot-beds, never gain such a degree of strength and consistence as those which grow in the sun. In the latter, every thing combines for the perfection of plants and animals; whereas in artificial heat, we see nothing but the weak and languishing efforts of an ineffectual substitute. But would the sun exist, and could it communicate light and heat to us, if the Creator of all things had not formed it, and given it the power of shedding over the whole earth its quickening virtue! It is from the Lord we receive all the blessings which are derived from the sun. It is he who created it, who rules its course, and who preserves its light and splendour. Each morn he causeth it to appear again, and in each season makes us feel its happy effects. Without Him there would be neither sun, nor light, nor heat, nor spring.—The Pagans were too blind to acknowledge God as author of the sun. They stopped at the effects, without knowing the cause. But we know there would be no sun, if He did not exist; that it would neither give light nor heat, if not ordained by God. We know that vegetation, increase, growth, all the blessings which surround us, all our agreeable sensations, all that charms or delights us, proceed from him. The sun is but the instrument of his goodness, the minister of his will, the herald of his greatness.

LESSON XLVI. SIXTEENTH WEEK.

RELATION THAT ALL CREATURES HAVE WITH ONE ANOTHER.

THE prodigious number of creatures there are upon the earth is, in itself, well worthy our admiration; but what must still more strike us is the proportion between all these, and the wise chain which links this infinite multitude of different beings in such a manner, that they form but one regular and perfect whole. The extent of the animal creation is incomprehensible, and yet all of them find food sufficient. No species, however few there are of them; no individuals, however persecuted they may be, are ever extinct. It is true, that many serve as food to others, but the number of beasts of prey is not considerable. Most of them are solitary, and do not much multiply: even those that are pretty numerous, are content with little food, and cannot obtain it without much art and trouble. Several of them have enemies which prevent them from multiplying too fast; or else the weak and timid animals supply in number what they want in strength, and escape their persecutors by all sorts of stratagems and cunning. The mineral kingdom serves for the preservation of the animal, and they both tend to the good and benefit of mankind. The most useful plants, such as corn, grow every where, multiply the easiest, and are the least liable to spoil. The animals which are most necessary to mankind are scattered every where in abundance. The productions of the different climates are suited to the particular wants of mankind. Thus, the hottest countries abound in cooling fruits. In countries liable to a great drought, there are plants and trees, which are, in a manner, springs of water, and which provide enough to quench the thirst of men and animals. Where wood is wanting, there is a great quantity of peat and turf found. If there are countries deprived of rain, and other sources of fertility, they are made amends for it by fruitful inundations, like that of the Nile in Egypt. In civil society, talents and blessings are so admirably distributed, that, as each individual may be happy, according to his circumstances, so there is nothing, that is necessary, wanting to society in general.

If the inclinations and dispositions of men were not so varied; if their tastes and tempers did not make them embrace different kinds of life; if there was not so much variety in their genius, their way of thinking, in their beauty, riches, and other outward circumstances, human society would soon become a melancholy desart. There is no rank of men who can do without others. Each country has its peculiar advantages; and, if they were common to all, there would be neither connexion nor commerce between men. On whatever side we cast our eyes under heaven, we every where find the most admirable harmony and proportion. Notwithstanding the infinite variety of creatures, and the continual interruption of many of the laws of nature, it appears, that in this immense universe, all is perfect, all is planned and contrived for the general good, all is in the most regular and exact order. On whatever side I cast my eyes, I see nothing but the wisest and most delightful harmony. It shines on all sides. It embellishes every thing. Nothing is unconnected. Every thing combines to the same end. The whole is linked together with wonderful art, and all the parts declare the power and wisdom of the great Creator.

LESSON XLVII.

THE PRODUCTION AND INCREASE OF PLANTS.

IN general, vegetables spring from seed, and in most plants it is the flower of blossom which produces the seed, and makes it fruitful. Almost all flowers are folded up in a bud, where they form themselves secretly, and are guarded by their coat, and outside leaves. Then, when sap flows in abundance, particularly towards spring, the blossom grows large, the bud opens, the coat falls off, and the flower appears. In the middle of the flower, there is a thread or a little pillar called *pistil*, which rises pretty high, particularly in tulips. Round the pistil are the *stamina*, with heads at the top of them, containing dust of different colours; which being scattered by the wind over the flower, makes the seed perfect.

Vegetables increase also by ingrafting. From a tender branch of a tree, when in sap, they take an eye, or a beginning of a branch, with a part of the bark, and they graft it into another tree; that is to say, they insert this eye between the bark and the wood, after which they gently tie up the whole, by rolling worsted two or three times round it. From that eye there comes a branch, which is of the same species as the tree from whence the eye was taken, though the tree into which it is inserted (and which is called *wild stock*) should be quite another sort. Trees and other woody plants are also perpetuated by slips. From a willow, for example, they take a slip, that is to say, a single stick or branch, and put it into the ground, after having cut off the branches, that it may not in the beginning draw too much sap. Roots soon shoot out of it in the places where it had beginnings of branches, and in time it becomes a tree.

Vegetables also increase by roots; but these must have eyes, or they will not shoot. Certain plants, as strawberries and violets, cast all around them trains or long shoots, which have knots or eyes in them; these knots lengthen their fibres, strike into the ground, and become so many new feet, which may be separated from each other, to make so many more plants. The root even is a sort of eye, in which the plant is inclosed; and it has between its leaves little eyes, so that it may also be renewed by the leaves, when the little eyes or roots remain fastened to them. What a train of causes must operate to produce vegetables, to preserve and renew them. Supposing even that the seed preexisted, what art does it not require to open them, to give growth to the plant, to preserve and continue the species? The earth must be a fruitful mother, in whose bosom plants may be placed and nourished conveniently. Water, which contributes also to the nourishment of plants, although in a less degree, must be composed of all those parts which are best calculated to make them shoot and grow. The sun must put all the elements in motion, and by its heat cause the seed to spring up, and ripen the fruit. It was necessary to form a just balance and proportion between the plants; in order that they should neither multiply too fast, nor be too few in number. It was necessary, that the texture, the vessels, the fibres, and every part of the plant should be so disposed, that the sap, the nourishing juice, should penetrate into it, circulate, digest, and prepare itself in such a manner, that the plant should receive the proper form, size, and strength. It was necessary to fix exactly what plants were to spring up of themselves, and what were to require the care and culture of men.

In all this I acknowledge thy wisdom and goodness, O adorable Creator! Every spring thou renewest the face of nature, and crownest the year with thy blessings. Let the earth, as well as the heavens, declare the glory of thy great name, now and for evermore.

LESSON XLVIII.

FLOWERS OF THE MONTH OF APRIL.

THE nearer we approach the month, which presents to us the country, the fields, and gardens in full beauty, the more we see the wild and melancholy appearance of nature wear off. Each day brings forth some new creation, and nature draws nearer to perfection. Already the grass begins to shoot, and the sheep run eagerly to feed. The corn begins to appear in the meadows, and the gardens become cheerful and pleasant. Some flowers show themselves here and there, and invite the florist to observe them. The sweet and modest violet is one of the first productions of spring; its smell is so much the more agreeable, as we have been so long deprived of those delightful perfumes. The beautiful hyacinth rises insensibly in the midst of its leaves, and shows its little flowers, which equally delight the sight and smell. The crown imperial flower casts around it a multitude of starry leaves; its stalk rises high, and its red and yellow blossom, shaped like a bell, and inclining towards the earth, forms a sort of crown, with a tuft of leaves at the top. From the centre of its leaves the auricula raises its flower, which imitates the richness of satin and velvet; its elegant form and sweet perfume make amends for its want of stature. The tulip comes out more slowly; it does not yet venture to open, because the night air, or cold rain, might spoil the beauty of its colours. The ranunculus, the pink, and the rose, do not blow till milder days allow them to appear in full beauty. An attentive observer will find in these subjects, many reasons to admire the wisdom and goodness of his Creator.

It is for very wise purposes, that at the return of spring, each plant begins precisely in the time and the order prescribed to it, to open its leaves and blossoms, and to prepare every thing for the production of its fruits. There is a constant succession of vegetables from the beginning to the end of the year. Some are scarcely visible, when others prepare to appear; and those are followed by several hundreds of others, which spring up each in its turn, and at the appointed time. Whilst the fruit of one plant is ripening nature prompts another to propagate, that its fruit may be ready by the time the former has fulfilled its destination: Thus nature continually offers us an agreeable succession of flowers and fruit. She leaves no void; and, from one end of the year to the other, she watches over the successive generations of plants. But why has not our Creator given us the enjoyment of more plants at a time? The reason of it is evident. For how would it be, if all the flowers and fruit came at the same time? Would there not be seasons entirely without vegetables? Should we not be deprived of the pleasures which those agreeable and progressive changes procure us, by preventing the disgust inseparable from a sameness? How many plants would perish, if they were now exposed to the cold nights which are sometimes felt even in spring? Would so many millions of animals and insects find subsistence, if all the plants blossomed and bore fruit at the same time? The beneficent Creator has thus provided for our maintenance and pleasure. Those two views could only be fulfilled, by ordaining that nature should not produce all the vegetables at the same time, but successively, and by degrees.

Let the lovely and sprightly youth consider and behold in these flowers the image of themselves. They also are placed in a fertile soil, and have many charms for which they are beloved.—Observe how soon the violet, the auricula, and the hyacinth fade, when the north wind blows upon them. Young man, think of the shortness of thy days, and be not vain of the flower of thy youth. Life is like unto grass; it flourishes as the flower of the field. "As soon as the wind goeth over it, it is gone, and the place thereof shall know it no more."

LESSON XLIX. SEVENTEETH WEEK.

THE RETURN OF THE BIRDS.

A SMALL number of birds pass the winter with us; but whole families have gone out of our countries. Some sought milder climates than ours; others found warm retreats in caves, in hollow ground, and other such places. By degrees those birds return to us. The mild air in spring awakens the swallow from its benumbed state; and a secret instinct brings back into their own countries, the birds who, last autumn, undertook a long passage beyond the seas, in search of subsistence, and of the climate their constitution required. Their return is usually in this order, that those who went earliest return soonest. The air will be filled again with winged songsters. The groves will respound with the harmonious notes of the nightingale. The swallow will return to the nest it had built the winter before. The stork will find the very house it left at the beginning of the winter. In a few weeks, the air will resound with the songs of birds, and their return will fill the plains and the valleys with joy and gladness.

Two things particularly are remarkable in this emigration of birds. The first is, that they know exactly the time when they ought to return. "The stork in the heavens knoweth her appointed time; and the turtle, and the crane, and the swallow, observe the time of their coming." Undoubtedly the temperature of the air, in respect to heat and cold, and the natural inclination of those creatures to bring up their young, are their greatest motives for changing their place; but it is, in other respects, a very extraordinary instinct, and in some degree inexplicable. It is no less wonderful, that those animals, void of reason, know so exactly the way they are to go, and how far it is. Without compass or guide, without provision, and in the most regular order, they undertake and finish a journey of sometimes more than 200 miles. Who then has taught them to follow a certain road in an element so inconstant as the air? Who informs them how far they are gone, and how far they have yet to go? Who is it that guides, feeds, and furnishes them with all necessaries for their journey? Do not those animals do what men themselves would be unable to do? To undertake journeys of such a length, what experience, what assistance, what directions and preparations we require! Can we even, with the assistance of our reason, with a compass and geographical maps, follow so invariably the road over seas and mountains, as the birds do? In whatever light we consider this, we may plainly discover a power superior to the mere instinct of animals. We must acknowledge, that an Almighty Power has impressed this instinct on the mind of the birds, which they so regularly follow.

LESSON L.

PLEASURES WHICH THE CONTEMPLATION OF NATURE AFFORDS.

NATURE offers to all her children, with maternal goodness, the first, the most innocent, the least expensive, and most universal of all pleasures. It is that which our first parents enjoyed in paradise; and it is only the fallen state of man which makes him seek other pleasures. Men are apt to despise the daily blessings they enjoy, however excellent; and they only think of multiplying and varying their amusements. It is certain, however, that the pleasure I speak of, is preferable to all others. It is almost impossible not to find charms in the contemplation of nature. And that it may be enjoyed without expence, is manifest; the poor as well as the rich may indulge it. But that is what lessens the value of it. We are so foolish as not to prize what others share with us; while, if we were reasonable, nothing should give more value to a blessing, than the thought that it makes the happiness of our fellow-creatures as well as our own. In comparison of this pleasure, so noble and sensible, how trifling and vain are those far-fetched magnificent amusements, that the rich obtain with so much trouble and expence, which leave a certain void in the soul, always ending in disgust. Whereas, nature, rich and beneficent, presents us continually with new objects. Pleasures, which are only the work of our own imagination, are of short duration, and vanish like a dream, the charms and illusions of them are lost at the moment of waking. But the pleasures of reason, and of the heart, those we enjoy in contemplating the works of God, are solid and lasting, because they open to us an inexhaustible source of new delights. The starry sky, the earth enamelled with flowers, the melodious songs of the birds, the various landscapes and prospects, every one delightful, may continually furnish us with new subjects for contemplation. If we are insensible to these, it is certainly our own fault; it is because we behold the works of nature with an inattentive and indifferent eye. The duty of a Christian consists in enjoying innocently all that surrounds him. He knows how to draw resources from every thing, and has the art of being happy under any circumstances, at little expence, and without danger unto his virtue.

Lord, teach us thyself to know and to feel thy power and goodness. For, it is only in studying to find thee in all thy works, that we can open to ourselves an inexhaustible and pure source of delight. We shall then have a foretaste of that fulness of joy, which we shall experience in thy presence for evermore.

LESSON LI.

ANIMALS ARE CAUSES FOR MAN TO GLORIFY GOD.

IT is not sufficient that we treat animals with kindness; we ought also to endeavour to make the best use of them. How then can that be, but by making them serve to glorify God?

This all creatures do, but particularly the animated beings. In every plant, tree, flower, or stone, the greatness and glory of the Creator are visibly imprinted, but it appears with still more lustre in the animal creation. Examine the construction of one only of those animated beings. What art, what beauty, what admirable wisdom shall we find; and how will these wonders multiply, if we think of the almost infinite number and astonishing variety of animals! From the elephant to the mite (which is only visible through a microscope) all is harmony! And if, at first sight, we think we discover any imperfection in certain things, we soon find it is only our ignorance, which has led us to form a wrong judgment. It is not necessary that every individual should make deep researches on this subject, nor be a learned naturalist. It is enough to attend to the most familiar and the best known things before our eyes.

We see, for example, a multitude of animals, all admirably formed; who live, feel, and move, as we do; who are, like us, liable to hunger, thirst, and cold, and consequently, require, as we do, that their wants should be supplied. To all those creatures God has given life; he preserves, he gives them what is necessary, and takes care of them, as a father of a family does of those that compose his household. Shall we not from thence conclude, that he has the goodness, the tenderness of a father? Shall we not also conclude, that we ought to love that Being, who is mercy itself? If the care of the Creator extends to animals, what will he not do for us? If he makes it his study to render the lives of those creatures happy and easy, what may we not expect from his beneficence? Let the cautious, fearful man then blush at his anxieties; he, who, as soon as he finds himself not in affluence, falls into apprehensions and fears that the Almighty will let him perish for want.

Let us indulge another reflection upon the instinct of beasts, and take occasion from it to admire and adore that Great Being, who so wisely combines the means with the end. As the instinct of animals all tend to their preservation, this appears most evidently in the love and care the beasts have for their young. Our Lord himself, to express the utmost parental cares, makes use of the image of a hen gathering her chickens under her wings. It is indeed a most affecting sight to behold the natural and strong affection the hen has for her young ones, and the constant care she takes of them. She seldom takes her eyes off them, but runs to their assistance at the approach of the least danger. She flies at the aggressor with courage, and hazards her own life to save that of her chickens. She calls them, and encourages them by her maternal voice. She spreads out her wings to receive and conceal them. She neglects all sorts of convenience to herself; and, in the most uneasy posture, studies the safety and welfare of the objects of her affection. Who does not here acknowledge the hand of the Most High! Without the maternal care of the hen; without that instinct so strong, and so superior to every thing, the chickens, the whole species would infallibly perish. Can it be said, that what the hen does for her young is done with understanding and reflection, that she judges, reasons, foresees, combines, and draws consequences? Certainly not. And though, at first sight, every thing really seems to proceed from the tenderness and understanding of the bird; yet we must acknowledge in it a superior hand, which shows itself, without our knowing in what manner it acts: therefore it is the duty of man, to seek in the animals an occasion to glorify God; it is an indispensable duty, which ought to be sacred to him, and is equally agreeable and useful.

LESSON LII. EIGHTEENTH WEEK.

REFLECTIONS ON THE BLOSSOMS OF TREES.

AT the time our gardens and fields are adorned with nearly all the ornaments of spring, all Europe appears with equal pomp, and every where presents the most cheerful prospect. The power of the first word pronounced by the Creator, when he formed the world, produced all these magnificent effects. He has in a few days renewed, and in a manner created the earth again, for the use and pleasure of his intelligent creatures. Come, O man! come and try what thy wisdom and power can do. Art thou able to make a single tree blossom, to order a single tulip to appear in all its beauty, or call from the earth the smallest blade of grass? Draw near, ye learned artists, and skilful painters! Contemplate these flowers, examine them with the most scrupulous attention; is any thing wanting to their perfection? Do you find any fault in the mixing of the colours, in their form or proportion? Could your pencil express the dazzling red of the peach blossom; could you imitate the fine enamel, the uniformity and simplicity with which a cherry-tree in blossom is adorned? But why do I say, imitate? Are you even capable of feeling all the magnificence of renewed nature, or of forming to yourselves a just idea of its inimitable art? If there were no stronger proofs on earth of the power and wisdom of God, the flowers of spring alone would be sufficient to convince us of it. Each tree that blossoms, each herb and flower proclaims his goodness and wisdom, which is over all the earth.

We remark an infinite variety in the blossoms of trees. All are beautiful; but their beauties are various. One surpasses another; but there are none which has not something pleasing peculiar to itself. However great the Creator in the dispensing his gifts, he still reserves to himself the liberty of bestowing more on some than others. But this difference is only in respect to accessary qualities. Such a tree, for example, has blossoms of a dazzling white; another has red stripes and shades, which the first wants: some, have added to the beauty of their form and colour, an exquisite perfume; all these differences do not in the least affect their fertility. Thus, though we have not the same advantages as appear in some of our fellow-creatures, it ought not to afflict or disturb us: for the loss of any accidental beauty, of whatever nature it may be, does not hurt our real welfare.

Let our chief study be, to act in such a manner, that when the beauty and charms of the body are no more, we may supply their place with abundant fruits of virtue and piety.

LESSON LIII.

THE DAWN OF DAY.

THE morning dawn discovers to the world a new and magnificent creation. The shades of night deprive us of the sight and enjoyment of the earth and sky, but when the light of day returns, we behold all nature renewed and embellished: the earth appears arrayed in all its magnificence; the mountains crowned with forests; the hillocks clothed with vines: the fields covered with their harvests; and the meadows watered with rivulets. The horizon glows; the clouds are all tinged with variety of the liveliest colours; cheerful flowery vales are discovered at a distance; and the dew-drops that fall on the flowers take the mild lustre of apparent pearls. By degrees, as the light increases, the spectacle becomes more magnificent. We go from light to light, till at last nature presents us with her most glorious object. The rising sun! and the first ray that escapes over the mountain which had concealed it from us, darts rapidly from one end of the horizon to the other. By degrees the disk of the sun appears, and at length shews itself entire; then advances and runs its course, with a majesty which the human eye can no longer support. O Lord! who art father of the whole creation, the joy and gladness of all nature, the animation of every being, invites me also to raise my soul towards thee with the most lively transports of gratitude and joy. Thou art the very source of light; from thee proceeds each beauty of the morning dawn. If thou didst not exist there would be neither sun, nor dawn, nor creation.

But are not those indolent men much to be pitied, who never gave themselves the heavenly pleasure of contemplating the rising sun? O, if they were but rational enough to indulge in the pure and delightful enjoyment which this magnificent object of nature is so calculated to inspire! If they could but feel, that the sight of beautiful nature must naturally fill the heart with pious delight, and profound veneration for the Creator! If they could, in fine, comprehend, that one single thought, which rises in the soul on seeing the dawn of day, may become the happy beginning of a Christian life, would it not be worth giving up some hours of sleep for it?

LESSON LIV.

THE SPRINGING UP OF SEEDS.

THERE are, at this season, many visible changes making in the vegetable kingdom, but there are still many more which escape our sight, and which nature performs in secret. The seeds which were some time since sown in the ground, swell, increase, take root, and by degrees the plant shoots up and grows. This mechanism deserves so much the more attention, as it is, properly speaking, the source of all the beauties which the spring and summer present us with in the vegetable kingdom. The seed is composed of different parts, according to the different species; but the chief is the *germ*.

Each shoot has two parts; the one simple, which becomes the root; the other scaly, which rises and becomes the stalk and head of the plant. The seed of most plants is composed of two pieces which are called *lobes*, that are filled with a meally substance. Mosses have the most simple seed of any. It consists only in the shoot, without pellicles or lobes. A certain degree of moisture and warmth are absolutely necessary to make the seeds spring up. The increase of heat, and the difference observable in the taste and smell of various seeds, seem to discover here a sort of fermentation. By means of this preparation the meally substance of the *lobes* becomes proper to nourish the tender shoot. It is known by experiments, which have been tried with coloured juices, that this substance sucks in a moisture, which furnishes a proper nourishment, with the assistance of air, and of heat, till the plant has acquired consistence enough to profit by the juices which the root procures for it. Then the exhausted *lobes* dry by degrees, and at the end of a few weeks, fall off, when the plant no longer requires them. Certain herbs, which grow on mountains, are of a very particular nature. As their duration is short, it often happens that the seed has not time to ripen. In order, therefore, that the species should not perish, the bud, which contains the shoot, is formed at the top of the plant, puts out leaves, falls, and takes root. But when the plant comes out of the earth, it would run too great a risk, if it was once exposed to the outward air and the power of the sun. Its parts, therefore, remain folded, and laid one upon another, nearly as it was in the seed. But, by degrees, as the root strengthens, and stretches on all sides, it furnishes the upper vessels with abundance of juices, by means of which all the organs soon unfold themselves. The plant is, at first, almost gelatinous, but it gradually acquires more consistence, and is always increasing.

This abridgment of the history of the shooting of plants is sufficient to show us, how many preparations and means nature makes use of, to produce one single little plant. When, therefore, we see a seed spring up, which we have sown, we must not imagine (as is frequently the case) that it is not worth our attention. It is one of those wonders of nature, which is a subject of reflection for the greatest mind. At the sight of this phenomenon, let us silently admire the power and wisdom of that God, who is adorable in all things.

LESSON LV. NINETEENTH WEEK.

ON THE BUDS OF FLOWERS.

WHAT a multitude of flowers in the bud, are at present enveloped and closely shut up in their intrenchments; all their beauties are hidden, and their charms are veiled. Such is the wretched miser who lives by himself, who centers all in himself, and whose views are mean and selfish; who makes his own private advantage or pleasure the only object of his desires, and the narrow motive of his actions. But soon the penetrating rays of the sun will open the buds of the flowers, and will deliver them from their silken bonds, that they may blow magnificently in our sight. What delightful perfumes will they exhale! Thus, also, may the most sordid miser become beneficent when his soul is enlightened by grace. To a heart of stone may succeed a feeling and compassionate one; susceptible of the sweetest and tenderest emotions. By the mild influence of the Sun of Righteousness, the social affections discover themselves, and open more and more. Sensibility no longer centers in one object; it becomes universal; extends its generous cares to all mankind, and all that is within its reach is benefited thereby. When I reflect on the buds and blossoms, I think of you, O lovely youth of both sexes! The beauty and power of your minds are not yet unfolded. Your faculties are still in a great measure concealed. The hope which your parents and masters conceive of you will not be so soon realized. When you consider these buds, say to yourselves, I resemble that bud; my parents and masters expect from me the unfolding of my talents and faculties; they do every thing for me; they neglect nothing for my information and instruction; they watch most tenderly over my education; to the end that I may become (first by blossoms, and afterwards by excellent fruit) their joy and comfort, and make myself useful to society. I will therefore do all in my power to fulfil the pleasing hopes they form. I will take advantage of all the improvement and instruction they give me, in order to become every day wiser, better, and more amiable. For this purpose, I will take care not to give way to the desires and passions of youth, which might be fatal to my innocence, and destroy all the hopes conceived of me.

LESSON LVI.

INDEFATIGABLE LABOURS OF THE BEE.

ONE of the advantages of spring is, that it furnishes us with an opportunity of observing the industry and labours of the bee.—Certainly a bee-hive is one of the finest sights a lover of nature can ever have. We are in a continual state of surprise on seeing their order and regularity; and particularly in those magazines so plentifully furnished with all that is necessary for the subsistence of the society in winter. What merits our attention more than all the rest is, the indefatigable application and uninterrupted labours of this little republic. The bees give us an example of industry and activity, which is not only uncommon, but perhaps has not its equal. They appear as soon as winter is over, even when it might still be feared, that the cold would hurt them, and benumb their delicate limbs. When the juices of the flowers which begin to blow have not yet been sufficiently digested by the sun, so as to furnish honey in plenty, the bees still gather some little for their food. But their cares and activity redouble very evidently during spring and summer. In the building their cells they are so indefatigable, that we are assured, that a honey-comb of double cells, back to back, such as three thousand bees can lodge in, is dispatched in twenty-four hours. This whole work is divided amongst the members of the republic. While some of the bees are gathering the wax, preparing it, and filling the magazines, others are employed in different works. Some take outward form, but also by their manner of being perpetuated, resemble plants. By this discovery, made in the first half of the present century, natural history has been greatly illustrated. It may even be said, that it has enlarged our ideas; and since the discovery of animal plants, it is almost impossible to determine exactly, where the animal kingdom ends, and where the vegetable begins.

It is generally believed, that the difference between plants and animals consists in the former having neither sensibility nor motion, and the latter having both. That is then the distinguishing character between plants and animals; but how faint the shade, how slight and almost imperceptible the line, which separates the two kingdoms, when we think of the discovery of the zoophites! Thus, the several species of creatures rise, grow to perfection, and approach one another so nearly, that the limits which separate them can no longer be distinguished. Throughout all nature, we see something of infinity, as the peculiar characteristic of its great Author.

LESSON LVIII. TWENTIETH WEEK.

THE PLEASURE OF CULTIVATING FIELDS AND GARDENS.

THE culture of fields and gardens is one of the most agreeable employments, and perhaps the only one that is compensated by so many pleasures for the trouble taken. Most works confine men to a room or shop, but he who devotes himself to country pursuits is in the open air, and breaths freely upon the magnificent theatre of nature. The blue sky is his canopy, and the earth enamelled with flowers is his carpet. The air he breathes is not corrupted by the poisonous vapours of cities. Many agreeable objects present themselves to his sight, and, if he has any taste for the beauties of nature, he can never want pure and real pleasures. In the morning, soon as day-break again opens the brilliant scene of the creation, he hastens to enjoy it in his fields or gardens. The dawn proclaims the near approach of the sun. The grass springs up again revived, shining with dew-drops, brilliant as diamonds. Delightful perfumes, exhaled from herbs and flowers, refresh him on every side. The air resounds with the songs of birds, expressive of their joys and their happiness.

Would it be possible, at the sight and sense of so many pleasing and affecting objects, that the heart should not be touched with delight, with love, and gratitude towards our Creator. What contributes still more, to render agriculture and gardening particularly agreeable, is the infinite variety of objects it affords, of works, and employment which attach us to it, by constantly affording new ones, and preventing the distaste inseparable from sameness. Nature presents the husbandman with numberless agreeable changes. Sometimes he sees the plants springing out of the earth; others rising high, and unfolding themselves; others again in full bloom.

Come, all people, bless the Lord, and praise his works. He is the source of all good. He sends the rain to water the barren fields, and it is through him alone that the earth becomes fruitful.

LESSON LIX.

THE TULIP.

THE tulip is certainly a very beautiful flower; and, if we consider that every year there blow millions of tulips, which all differ from each other, the proportion and beauties of which are infinitely varied, we must have lost all feeling not to be struck with admiration. Certainly, to be convinced of the existence of a wise and good God, we need only contemplate a tulip in full bloom. Therefore, when we look at a bed of tulips, let us not limit ourselves to the admiration of their beauty, but let us admire, above all things, the infinite wisdom of that Being who has formed these flowers, and executed them in such perfection. Whatever charms the tulip possesses, it loses a little of its value, in being merely food for the eye, and having no sweet smell. For when we compare it with the carnation, which, joined to the beauty of its form, has the most exquisite perfume, we soon forget the gaudy dress of the tulip. Such is the fate of persons, who are endowed with beauty, and set off their charms with every ornament, but are destitute of the beauties of the mind. The former captivates but for a very short time, while the beauty of the mind remains when all the charms of form are fled; and the esteem which our virtues inspire, is constant and durable. A virtuous soul is formed by the rules of wisdom, and its ornament is innocence. The perfume of good works is spread around wherever it exists, and it will, one day, be transplanted into the garden of Paradise. One observation which the history of plants affords us, is, that the more beautiful a flower is, the sooner it fades. In a short time, nothing of that blooming tulip will remain but a withered stalk. Its life and beauty last but for a few weeks; age destroys its charms; its leaves fall; and its colours fade. What a useful lesson is this for us. Let us remember how uncertain and frail is beauty, and rest our hopes of distinction upon the more solid basis of intellectual attainments.

LESSON LX.

THE LANGUAGE OF ANIMALS.

MAN, properly speaking, is the only animal who can be said to have language; and it is particularly by this circumstance, that he shows his superiority over all other animated beings. It is by means of speech that he extends his empire over all nature, that he rises towards his Divine Author; contemplates, adores, and obeys him. It is by this faculty that he learns to know himself and all the creatures around him; and to make them serve for his use. Every animal but man is deprived of this faculty, because they are void of reason; and it is reason which capacitates us to learn languages, and the use of speech. But as animals make their wants and feelings known by natural signs; as they utter certain sounds, which express the sentiments that affect them, one may so far allow they have a sort of language. The variety of these tones, their number, their use, and the order in which they follow one another, form the essential parts of their language. To form a just idea of this, it is not necessary to have recourse to deep researches: it is enough to observe the animals daily before our eyes, and with whom we have a sort of intimate connexion. Examine the hen with her chicks: if she finds any food, she calls and invites them to it. They understand her, and come instantly. If they have lost sight of this tender mother, their plaintive cries express their anguish, and desire to see her again. Attend to the different cries of the cock, when a stranger or a dog comes into the poultry yard, when a kite, or any other enemy appears, and when he calls or answers his hens. How lamentable are the cries of the turkey, when she sees a bird of prey hovering over her and her brood, while the young ones lay as if lifeless until the danger be passed and the bird disappears. There is much variety in the language of the dog. Who can be insensible to the joy that this faithful servant shows at the return of his master. He jumps, he dances, he runs here and there, turns quick and lightly round his master, stops all at once; fixes his eyes on him with the greatest tenderness; draws near him; and licks and caresses him repeatedly. Then beginning his play again, he puts himself into all sorts of attitudes; barks; tells every body how happy he is; and shows his joy many ways. But how different are these sounds, from thoses noises he makes at the sound of a robber, or on seeing a wolf. If we follow a dog in the chace, we see how he makes himself understood, by all his motions. How well adapted his signs are to the discoveries he wishes to make! This affords us an opportunity to admire the wisdom and goodness of the Supreme Being. What beneficent attention has he shown towards animals, in granting them the power to express by sounds their wants and feelings! From their organization, and the nature of their souls, it was impossible they should speak the human language; but they would have been much more to be pitied, and less useful to us, if the Creator had entirely deprived them of the power of making themselves understood. To compensate them for the want of speech, he endowed them with the address to communicate, by various little ways, their feelings to one another, as well as to mankind. He has given them organs, proper to produce and vary a certain number of sounds; and their make is such, that each species has particular and distinct sounds, by which they make themselves understood. In a word, the Creator has given as much force to the language of animals, as their nature would admit of; and all that the end for which they were created required. But as for us, we possess faculties in all respects much superior. We can rise to general notions, and separate the object from the qualities which distinguish it. We can, by means of an infinity of sounds, express all our conceptions.

O thou, the great Creator! what gratitude do we not therefore owe unto thee! Grant that we may never forget this important part of thy blessings; but, on the contrary, that each time we make use of speech, we may reflect on the excellence of our privileges, and the greatness of thy wisdom and goodness.

LESSON LXI. TWENTY-FIRST WEEK.

COMPLAINTS OF MANKIND RELATIVE TO CERTAIN INCONVENIENCES IN THE LAWS OF NATURE.

"WHY is the human body, from its constitution, liable to many infirmities and accidents?" Whoever asks this question, should consider how impossible it would be to form one's self a body, which unites more advantages in itself, than that which we have received from our Creator. It was incompatible with nature, and the chain of things in this world, that man should have an invulnerable body. If one of our fellow-creatures be deformed; another lame; a third deaf or dumb; is it a reason for us to murmur against God? Are those defects so common as to give us reason to complain? If, after these questions, any should still think they have reason for discontent, let them reflect, that, it is of use to men, in general, that they may not want examples of the defects to which the human body is liable. For, when a person, perfect and well made, compares himself with one that is crooked and deformed, he is sensible of all the advantages of well formed limbs; he learns to value properly a gift till then unthought of, and take more care to preserve it How valuable is each eye, each ear, each organ of sense, each joint, each limb, if we only observe the condition of the few people who are deprived of them!—Would any of us part with a limb, in exchange for the greatest treasure? Are not our bodies more beautiful and regular, than the finest building, or the most curious machine? And, though the latter are very inferior to it, we are far from attributing the assemblage of their parts to chance. "Why are the countries of the earth so different from one another, sometimes cold, sometimes damp, sometimes low, and sometimes high?" But, O man, if thou hadst the power to form a globe, wherein every thing was to be for the advantage of men and animals, would thy understanding furnish a plan better than this? The countries of the earth, by means of their difference, produce variety of exhalations and winds, which occasion that mixed air, wherein, experience tells us, that men and animals live healthy and contented in most places, and wherein plants also grow and increase. "It is however allowed, that the variation in weather is not beneficial to all men, or to all countries." But, has not the preceding weather influenced the following, as the climate of one country often influences another. Are we capable of judging of the whole? Must a number of farmers sigh in vain for rain, because dry weather would suit the private convenience of one family! A certain temperature of the air may occasion, here and there, a transient barrenness; but, can it be called an evil, if it was necessary in order to hinder the air from corrupting? Is it reasonable, when we cannot take in the whole, to find fault with a part? "Why are there so many hurtful animals?"

Would it then be better to have no beasts of prey, small or large, upon the earth? They put a stop to the number of animals, that would otherwise overpower us; and, it is because many animals serve for food to beasts of prey, that the number of living creatures increases every year. If these beasts of prey did not exist, the carcases of the animals on which they feed, would not only be useless to living creatures, but would be hurtful. Every year, animals thus devoured are replaced by others; and, in most cases, population depends on the quantity of sustenance. Thus gnats, and other insects would soon want food, if the animals, whose prey they are, did not prevent them from multiplying too fast. "Why has the Creator regulated the course of nature by such invariable laws?" It is in consequence of such regulation, that man's experience and labour enable him to make use of his understanding and powers; so as to be, in some measure, master of his own welfare. Do we wish to inhabit a world, where we should have no occasion to do any thing; where we could not in any way promote our own pleasures; where there should be no rule, no fundamental law; where, the best, the bad, and the worst, being equally unknown, nothing could make us attend to the laws of nature?

Doubtless, there will ever be a number of things in nature, the purposes of which, or their relation with the whole, must ever be concealed from us. But on all occasions, let us rest in this principle, that the Almighty does every thing for wise and beneficent purposes.

LESSON LXII.

THE HARMONY AND PATRIOTISM AMONG THE BEES.

UNION and patriotism form undoubtedly the fundamental happiness, which may, in some measure, be ascribed to bees. It is at least certain, that their republic would soon be destroyed, if they did not live in great harmony amongst themselves. Those who have made observations on this subject, inform us, that when the bees return to their hives, loaded with materials for building, they find some of their companions ready to relieve them from their burdens. The travellers begin their journeys again; and while they are gathering more provision, the working bees which remain in the hive, knead together the little the others had brought; and thus prepare a mass proper for the building. Some, who are not directly employed in work, are busy in doing good offices to those that are; and bring them food, in order to let the work go on without their losing by it. This harmony nearly approaches to the patriotism observable amongst men. The riches of a nation are the riches of each citizen; and this numerous republic forms but one family. Here there is no self-interest, no avarice, and consequently no rapine. Here the bees never assemble together to use violence, and fight battles with their country people. Here we never see one bee avariciously wishing for more than is necessary, whilst another is in want: neither do they ever try to get more honey, when they have laid in a sufficient provision for the winter.

Insignificant as we reckon these insects, we may learn from them virtues, on which depend the repose and happiness of our lives! In whatever rank or condition we are, it is necessary to act in concert with our fellow-creatures. The society in which we live, Christianity, and our own happiness, require it. Let each of us cheerfully bear our part in the general burden; and, if it is necessary, let us even take upon us the burdens of others, when, through ignorance or weakness, any may be deficient. And if it should so happen, that religion, duty, and conscience, require us to make great sacrifices to our fellow-creatures, let us take care not to consider it as an evil, let no visible selfishness ever find room in our hearts. Those who seek to enrich themselves, at the expence of others, are contemptible members of society. When we can in any ways contribute to the general good, let us not be deterred from it, by the fear of having no reward: are not the testimony of a clear conscience, and the blessings of eternity sufficient rewards? It is too true, however, that among the evils of this life, which we form to ourselves, we must reckon this one, that there is no such thing as perfect agreement in sentiments and characters: but, even this ought to make us admire the wisdom of Providence, which, notwithstanding the disunions and disorders of the world, notwithstanding the self-interest which governs mankind, still keeps up society and makes it flourish. When a pilot knows how to direct his ship, so as to avoid the sand-banks, against which it might be cast by the waves, it is then that I admire his skill and experience. And when I see, notwithstanding the wickedness of mankind, in the midst of the storms of passion, that wisdom and virtue still preside, I admire the infinite goodness of him who governs the world.

LESSON LXIII.

THE PRODIGIOUS NUMBER OF PLANTS ON THE EARTH.

ABOVE twenty thousand different sorts of plants have been already reckoned, and we discover new ones every day. Some have been found out by the help of the microscope, where they were least expected. Mosses and sponges have been classed among vegetables, and have discovered to the virtuosi flowers and seeds before unknown. Freestone is often covered with dark brown spots, and the same is seen on the best polished glass. This mouldy substance sticks to most bodies, and it is a garden in miniature, a field, or a forest, where plants have their seeds, which blossom visibly, notwithstanding their extreme littleness. If we reflect on the quantity of moss, which covers even the hardest stones, and the most barren spots; on the quantity of herbs and grass; on the several sorts of flowers; on all the trees and bushes, each of which may be considered as an assemblage of a thousand different vegetables; if we add to these the aquatic plants, as slight and delicate as a hair, and most of which are still unknown to us, we may form some idea of the multitude of plants upon our globe. It is more wonderful how all these different sorts of plants are preserved, without destroying one another. In order to prevent this, the Sovereign Disposer of all things has appointed to each species of vegetables a place analogous to its peculiar qualities. He has distributed them upon the surface of the earth, with so much wisdom and propriety, that no part of it is destitute, nor do they grow in too much abundance any where. This is the reason that some plants require growing in an open field, and not in the shade, where they would at least grow languid and weak. Others can only subsist in water, where the different qualities of the fluid matter occasions great variety. Some plants grow in sand, others in marshy and muddy places. Certain vegetables spring above the surface of the earth, others unfold themselves within its bosom.

The different strata of which the soil is composed, sand, clay, chalk, &c. have each their particular vegetables; and from thence it is, that in the immense garden of nature, there is no place absolutely barren. From the smallest dust to the hardest rock, from the torrid to the frigid zone, every soil, every climate, has its peculiar plants. Another circumstance is well worthy our admiration; the Creator's having so ordained, that, among this great number of plants, those used for food or medicine increase much more abundantly than those of less use.

LESSON LXIV. TWENTY-SECOND WEEK.

PLURALITY OF WORLDS.

IT is not through ignorance alone, it is more through self-love and pride, that we call nothing the world but one of the least parts of the universe; persuading ourselves that our globe alone is peopled; that the sun was made merely to communicate its light and heat to us, and that the moon and stars are of no other use but to light our nights, and show the traveller his way. The contemplation of the fixed stars is sufficient to contradict this ridiculous opinion. Their twinkling proves, that they shine with their own light; and their being visible to us, at the immense distance they are from us, proves that they are much larger than the sun. Is it then probable, that these celestial bodies, which are not luminous specks, but great suns; these numberless bodies placed so far from our globe; that they should not be created for better purposes? If the purpose of them were only to serve as nocturnal lights to us, they would be of no use the greatest part of the year. The frequent cloudy skies, and the nights that are light from other causes, would make them useless. Those stars also, which the naked eye cannot discover from their great distance, would be absolutely of no use; and the purpose ascribed to them would be better supplied by one single star nearer to us, than by so many millions at that distance. As the same reasoning may be applied to all the uses the stars are of to us, either in navigation or any thing else, it must be allowed, that we could not possibly account for the design of those numerous suns, if no creatures except those of our own globe profited by their light and heat. This conclusion appears still more natural, if we reflect attentively on our solar system. We observe that the moon in many thing resembles this earth; that there are land and sea, mountains and valleys, islands and gulphs. Such affinities as these authorise us to admit others, and to suppose also in the moon, minerals, plants, animals, and rational creatures. The analogy between the moon and the rest of the planets lead us to form the same conjectures of them. And as each star has, to all appearance, like our sun, its particular planets, and as these undoubtedly resemble ours, we in a manner behold around us an innumerable multitude of worlds, each of which has its peculiar laws, arrangement, productions, and inhabitants. How numerous are the works of God! How glorious the starry sky appears! Millions of worlds declare his glory, and the intelligent beings they contain acknowledge and adore their Maker. How forcibly does this incline us to join with the heavenly choir, in singing the praise of the Most High, that it may resound over all the universe! How happy the prospect that opens to us of that future state, wherein we shall be acquainted with these worlds, and be able to comprehend the wonders of them!

LESSON LXV.

LEAVES OF TREES.

THE leaves of trees form one of the great beauties of nature. Our impatience to see them in spring, and our joy when they do appear, prove sufficiently, that they are the ornaments of our gardens, fields, and woods. How great the pleasure we enjoy in the hot summer days, from the refreshing coolness of their delightful shade. Yet, after all, this is certainly the least of the advantages, which accrue to us from the foliage of trees; we need only consider the wonderful construction of leaves to be convinced that they were designed for much more important purposes. Each leaf has certain vessels, which, being pressed close at the end, or in the stalk, extend themselves like ribs within the leaf, and branch out in a thousand ways. There are no leaves without these extremely fine vessels, and an astonishing number of pores. The nourishment of many plants proceeds directly from the leaves; their pores serve to imbibe the moisture, or the juices of the atmosphere, and to communicate them afterwards to the whole plant. By these means the plants in dry weather run no risk of wanting nourishment. They receive abundance of refreshing dew, which, falling from the upper leaves, waters those beneath them, and thus none of this nourishing juice is lost. Many experiments tend to show us, that plants perspire greatly, and that the leaves appear to be the principal organs of this important operation. They serve also to introduce into the plant the air it requires. They even contribute to the preservation of the bud, which is to succeed in the following year; for the eye of the bud is already under the stem of the leaf: undoubtedly it is guarded and preserved by them; at the same time that the quantity of juice, where the leaf joins to the plant, also serves to nourish it. This is the reason, that many trees wither and die when their leaves are plucked off: it sometimes happens to the mulberry tree, when it is stripped without proper caution to feed silkworms. This is also the reason that grapes do not ripen, when the vine loses its leaves in summer. Another remark may be made on this subject, which very much opens to us the manner of the plant's growth: the under side of the leaves always turned towards the ground, is generally of a paler and less bright colour; it is more rough and spongy than the upper side. Here again we discover the wisest purposes: the side of the leaf next the ground is rougher, and consequently more full of pores, in order the better to imbibe what dew rises from the earth, and to distribute it afterwards over the rest of the plant in more abundance. The leaves then turn on the side that can best receive the nutritive moisture; and this is the reason why leaves of some plants incline very low down.

If we take notice of trees growing on a steep hill, we shall see that their leaves do not take a horizontal direction, but evidently a perpendicular one; which proves that the leaves draw towards the side where there is most moisture. These reflections may make us consider the leaves of the trees hereafter, in a different light from what we have hitherto done. If we did not know the inimitable art of their construction, nor the important purpose of their existence, it would not be wonderful, that we should see them with neglect and indifference. But when we know that each leaf is an effect of the Divine Power, and an organ of fruitfulness, it would be unpardonable to see them with inattention. They ought naturally to lead us to the following useful reflection: every thing, even the very smallest object in nature, has been planned with wisdom by the Creator.

LESSON LXVI.

THE REVIVING POWER OF THE SUN.

THE splendour and warmth of the sun inspire me with spirit and activity, sufficient to fulfil the duties of life, and to enjoy society. The involuntary indolence and lowness, which made me inactive in winter, are by degrees vanished. I breathe more freely, and I employ myself with more pleasure. How can it be otherwise, when I am witness to the universal joy which the sun communicates to the world, and every where perceive its enlivening powers? It animates and revives all creatures with its benign influence. Millions of shining insects awake, sport, and bask in its rays. The birds salute it with their melody. Every thing that breathes rejoices in it, and we every where trace its happy effects. It causes the sap to rise and circulate through trees, plants, and vegetables, and the leaves and blossoms to shoot. It ripens the fruit and gives it colour. It sheds life and light throughout all nature, and is the source of that warmth, without which every animal would languish and die. The effect of the sun is not only felt on the surface of our globe, but even in caves under ground, where it produces metals, and also animates living creatures. It penetrates into the highest mountains, though they are composed of rocks and stones. It extends even to the bottom of the ocean, where it acts in several ways. When we reflect on these useful effects of the sun, it is natural to think of the miserable condition we should be in, if we were deprived of the light and heat of that celestial body; what would our globe be but a lifeless mass, without order or beauty? The trees could not produce leaves, nor the plants flowers; the fields would be without verdure, and the country without harvest; all nature would have a gloomy, melancholy appearance.

The sun with its reviving power is the emblem of a truly charitable Christian. He also spreads joy and blessings around him. By him the oppressed heart is raised and strengthened, the afflicted are comforted, the ignorant are enlightened, and the poor relieved. Oh! let us hereafter resemble this beneficent and charitable man. Let us, according to our different stations, share with our fellow-creatures the goods which Providence has bestowed upon us. Without partiality or prejudice, let us hold out assistance to all who want it. Let us instruct one, comfort another, feed the hungry, relieve the distressed. Thus shall we quit this world regretted, yet beloved, and our memories be blessed by our fellow-creatures.

LESSON LXVII. TWENTY-THIRD WEEK.

THE DESIRES OF THE SOUL ARE INFINITE.

LET us employ some moments in reflecting on ourselves. The soul has certainly the first claim to our attention. It touches us nearly, and ought to be dearer to us, than all the pleasing objects which this season so particularly affords. Whatever satisfaction we find in contemplating the corporeal world, it cannot be compared to that which we experience, in reflecting upon the nature and faculties of the soul. The observation of exterior objects, such as the traveller meets with on the road, is certainly agreeable to him, because he requires to be amused and refreshed through his pilgrimage; but that of spiritual objects, leads directly to the blessed immortality we may expect, as citizens of the world to come. Let us therefore sometimes reflect on the desires implanted in our souls by the Creator. Experience proves, that our thirst of knowledge can never be fully gratified. We have no sooner made one discovery than we aim at another. Our desires are never satisfied; and when we at last obtain what we had most ardently wished for, we begin again to form new desires: that of acquiring more and more blessings accompanies us through life, and even in the moment of quitting the world. What conclusion can be drawn from this, but that, as our desires continually extend beyond the present, without being ever fully gratified, there must be blessings after death, beyond the limits of this life? We are not then designed for this transient life alone, but for an everlasting one. Is it probable, indeed, that man would be the only creature on earth endowed with faculties, without having, at the same time, the destiny for which these faculties were bestowed upon him? That man should have an instinct, without the means of satisfying it, and be in this respect more miserable than brutes? When a beast is hungry or dry, it always finds means to supply its wants. We see the silk-worm spin its bag, and shut itself up for its transformation. Would that happen if it was not designed for another state, in which it was to appear again under a new form? We see that birds lay eggs; would that be the case, if these eggs were not to serve for the preservation of their species, or that of other creatures? If our existence, then, was to be confined within the narrow limits of this life, why should we have received inclinations and desires which cannot be gratified, and faculties which we could never use?

Being of beings! our souls are capable of being filled with thy Spirit; grant that we may love thee above all things.

LESSON LXVIII.

THE USE OF VENOMOUS PLANTS AND ANIMALS.

EVERY thing on earth, considered separately, is good and wholesome; and, if any thing becomes hurtful, it is because we make a bad use of it, instead of that for which it was designed. From thence it is, that the sort of food, which preserves the life of one animal, destroys another; and that a plant which, in some cases, is considered as poisonous, is on other occasions very useful and salutary. Thus, for example, hemlock was formerly supposed deadly poison, and now a number of experiments assure us, it assists in admirable cures.

The multitude and variety of vegetables which grow upon the earth is prodigious; but we must not imagine they were all created for the use of man. Some plants are designed for beasts, others furnish us with dress and ornaments; some please our taste and smell, and a great number of them are medicinal. But the number of noxious plants and animals is nothing in comparison of the multitude of those that are of the greatest use to us. The Creator has also implanted a natural instinct in men and animals, which gives them an aversion to whatever is hurtful to them. The mischievous beasts have a certain fear of man, and scarce ever make use of their offensive arms, unless they are attacked or provoked. Besides, the most noxious animals have evident marks and characters, by which their dangerous properties are easily known; that, by being warned, we may avoid, or prevent the danger. The rattle-snake, which is the most venomous of all snakes, gives warning of its approach by the clattering of the rings in its tail. The crocodile is so heavy in its motions, and turns with such difficulty, that it is very easy to escape from it. Divine Goodness has even so wisely disposed things, that the most dangerous and venomous animals furnish the remedy with the poison. Thus the scorpion's oil is an infallible remedy for its venom. A bee bruised, rubbed, and put on the wound, cures the evil of its sting. The fat of vipers is also an excellent remedy against their bite. Several creatures which appear hurtful are not really so, at least in certain respects. Their poison, and even the organs they make use of to wound others, are absolutely necessary to them. One example may serve for all the rest: the bee often gives pain with its sting, but if it be taken from it, the bee can never be of any use afterwards. It is the same throughout all nature. Every thing that appears hurtful, is, in reality, indispensably necessary. Wherefore, then, has man the presumption to decide what is hurtful or useful in nature? Who can say it is contrary to the wisdom of God that we should sometimes feel pain? Do not the most disagreeable things often procure us the greatest advantage? In general, it is certain, that natural things are only hurtful by accident: and if we receive harm from them, we may often blame our own imprudence.

LESSON LXIX.

SINGULARITIES IN THE VEGETABLE KINGDOM.

THE variety of animals is so great, that it appears at first difficult to find connexion between them and plants. Some beasts live only in water; others only on land, or in the air; some can live in either, or both equally. But it may be said literally, that it is the same in respect to vegetables. There are plants which only live in the ground; others that only grow in water; others that can bear no moisture;

others, still, which live equally in land or water: there are even some that live in the air. There is in the island of Japan a tree, which, contrary to the nature of all other plants, which require moisture, cannot bear it. As soon as it is wet, it withers, and the only way to save it from dying, is to cut it down to the root, to dry it in the sun, and afterwards plant it in a dry and sandy soil. It has been discovered, that a sort of mushroom, of moss, and other little plants, swim in the air. The vegetation of the truffle is still more singular: this extraordinary tubercle has neither roots, stalk, leaves, nor blossom, nor even any visible seed: it draws its sustenance through the pores of its bark. But how it is produced, or why, in general, there should be no other herb found where this sort of mushrooms grows, and the earth be light and full of crevices, has not yet been accounted for. There is no plant which can better be compared to the land and water animals, than that sort of membraneous moss, called *nostoch*. It is an irregular body, a little transparent, and of a pale green colour. It trembles when touched, and is easily broken. It can only be seen after it has rained; it is then found in several places, but chiefly in uncultivated ground, and along the sides of sandy roads. It is formed almost in a moment; for when in summer walking in a garden, not the least trace of it is seen; on a sudden a storm of rain falls, and in an hour after, in the same spot, the whole walk will appear covered with a great quantity of it. For a long time it was supposed that the *nostoch* fell from the sky; but it is now known to be nothing but a leaf which imbibes a great quantity of water. This leaf, to which no root has been discovered, is in its natural state when well impregnated with water; but heat, or a high wind, makes the water evaporate in a few hours, and then the leaf contracts, shrinks, and loses its transparency and colour. From this circumstance it appears to grow suddenly, and to be created in a wonderful manner, with the rain; as a fresh shower falling on it, when it has been withered and invisible, revives and makes it again appear. But there are still more singularities worth observation among the vegetables. The whole atmosphere is filled with millions of invisible plants and seeds. Even seeds of a larger sort are scattered by the wind all over the earth; and as soon as the air has carried them to the places where they can thrive, they become plants; and it requires so little for that purpose, that it is difficult to conceive whence they can draw what is necessary for their growth. There are considerable plants, and even trees, that take root and grow in crevices of rocks, without the least appearance of earth. Vegetation is sometimes formed inconceivably quick: for example, if the seed of mushrooms or water-cresses be put into wet linen, they become a salad in twenty-four hours. There are plants which appear to have scarce any life, and yet they continue to exist. We often see willows not only hollow and decayed within, but the outer bark so hurt that there scarce remains an eighth part of it. These trunks, however, poor as they are, break out again every spring, and shoot into numberless branches and leaves. How wonderful it is, that the nutritive juice of plants is not only supplied by means of the root, but by the leaves also, which draw it from the air, and in some degree pump it in; and that there should be plants, the branches of which become roots, and the roots branches, according as they are turned in planting them! The great age to which trees arrive is also well worthy our admiration! There are apple-trees, which must be above a thousand years old; and, if we calculate in the gross, the fruit which such a tree produces every year, we cannot but admire the fertility of a pippin, which can singly supply all Europe with trees and fruit of that sort.

But we should never have done, if we were to pursue these reflections so far as they might lead. Every thing is full of wonders!—Every thing marks to us a Being of perfection, whose power, wisdom, and unbounded goodness, all join in bestowing upon us continual blessings and enjoyments.

LESSON LXX. TWENTY-FOURTH WEEK.

THE LOADSTONE.

THE loadstone is the most singular of all minerals in its properties. It is a stone of a dark grey colour, and has the virtue of attracting iron. This virtue is not equal throughout the whole stone, but resides chiefly in two of its points, called the poles of the loadstone. When this stone is suspended by a string, and unconfined, it constantly points one of its poles to the north, and the other to the south, if first put in motion, and then left it to itself. This regular direction, which only varies a little in some particular parts of the earth, has given the name of the northern pole to that which points to the north, and the southern to that which points to the south. The two properties of attracting iron, and pointing towards the north, is communicated to iron by rubbing it against the loadstone. This discovery introduced the magnetic needle, so indispensably necessary to navigators in long voyages; which proves, that things may become very useful to the world, though at first sight they appear of little importance; and that, in general, the knowledge and study of the magnificent works of the creation is of infinite advantage to the human mind. These virtues in the loadstone prompted the naturalist to examine further into it, with the hope, not only of finding out the cause of such surprising effects, but of discovering new properties in the stone. They were more fortunate in the latter than in the former. It was observed, that the loadstone does not at all times, and in all places, point to the north; but that it sometimes inclines a little to the east, and sometimes to the west, more or less. It was observed, that its attractive powers were equally strong, though bodies were placed between the iron and the stone, which might be supposed to prevent the effect. Glass, fire, water, men, and animals, with every metal, except iron, give free passage to the magnetic effluvia. It was discovered, that in two loadstones, the two poles of the same name, the two northern and two southern poles, repulsed each other, and seemed to fly one from the other. It was therefore concluded, that the power of attraction might be in the iron as well as in the loadstone, as they seemed to attract each other equally. In order to be convinced of this, one need only hang a loadstone on one end of the beam of a balance, and put an equal weight at the other end, and when the loadstone is balanced, and not in motion, to place a bit of iron under it: the loadstone will be immediately drawn down by the iron, and the other weight will fly up. If their situation is reversed, the loadstone will attract the iron in the same manner.

However singular these things are in the loadstone, there is another circumstance no less worthy of observation; which is, that all the endeavours and all the sagacity of the lovers of wisdom, who have taken such pains to discover the cause of these wonderful effects, have been hitherto fruitless. The loadstone is still a mystery to the human understanding. Let us not then be surprised, that in religion, which is above all that can affect the senses, we should find mysteries we cannot penetrate, and the perfect knowledge of which is reserved for the future state; but let us remember, that a considerable part of the happiness of the world to come, will consist in having a more perfect knowledge of all that can contribute to complete our felicity, and to prove the glorious attributes of the Being of beings.

LESSON LXXI.

THE WISDOM OBSERVABLE IN THE CONSTRUCTION OF THE BODIES OF ANIMALS.

THE formation of the animal body affords the most striking proof of Divine Wisdom. For, as some animals were to reside chiefly wings, which are the chief instruments of flight, are put in the properest place to balance the body exactly. What admirable work there is in every feather! What proportion we see in the manner of placing them! They are always so placed as to agree exactly with the length and strength of each other, and the large serve to support the smaller. In the bony part of the wings, what a multitude of joints, which open, shut, or move, according as is necessary, either to extend the wings or draw them close to the body! What extraordinary strength in the breast-bones and muscles, that the bird may cut the air with more rapidity! What incomparable art in the formation of the tail, to make it in some measure serve as a rudder to direct the flight, and help the bird to ascend and descend in the air, and prevent the unsteadiness of the body and wings!

Who is there that will not in this acknowledge the supreme intelligence of our Creator and benefactor?

LESSON LXXII.

OF THE DEW.

THE wise Ruler of the world, who watches continually over his children, and provides for all their wants, makes use of more than one means to render the earth fruitful. Sometimes it is by inundation, like the Egyptian river Nile, which has the singular property of overflowing its banks at certain marked periods, to water a country where it never rains. Sometimes it is by rains, which fall more or less frequently, in order to cool the air, and water the parched ground. But the most common means, the surest, the most universal, and that which men the least attend to, is the dew. This inestimable gift of Heaven, which even in years of the greatest drought supports and preserves the plant from perishing, is those sparkling drops seen in such profusion morning and evening on the leaves of trees and plants. The dew does not fall from above, as was formerly imagined, but it is now generally allowed, that it rises from the earth. In order to be convinced of this, we need only cover a plant with a glass bell, and it will appear that the leaves collect in the night a greater quantity of the dew-drops than the leaves of the other plants which are exposed to the air. This certainly would not be the case, if the dew fell from above, and if it did not rise from the ground. Nothing is more easy, than to comprehend how it is formed: for the rays of the sun, and the heat which is cast on the earth, continually loosen a multitude of moist particles from off every subject; some of which rise into the atmosphere, and the rest collect in the form of drops of water. This account of the dew explains to us, how it happens that it is sometimes hurtful, and sometimes not so. Its nature evidently depends on the quality of the vapours of which it is composed. The wind carries away the light exhalations as soon as they are formed, and prevents them from falling in drops. This is the reason that there is most dew when the air is very calm. By this wise plan of the Creator, the plants can vegetate and grow in countries even where there is no rain;

for the soil of those parts being sandy, porous, and very moist underneath, the heat draws out a greater quantity of dew, which supplies the place of rain.

Those different methods which Providence makes use of to moisten and fertilize the earth, ought to remind us of those employed to improve the barren heart of man, and to make it fertile in good works. How many hardened hearts oblige him to speak in thunder and lightning, as formerly on Mount Sinai! Less terrible means are employed to save and affect others; with a gentle, mild, and persuasive voice, he awakens their consciences, and refreshes their souls with the beneficent dew of his grace. Let this conduct of our Heavenly Father serve as a model for ours. Let us employ all means to reclaim our fellow-creature, to make him better; but let us particularly endeavour, to gain him rather by kindness than by punishment. Let us imitate the beneficence of the Lord, who refreshes the parched earth with dew; and gives new life to the plants. Let us endeavour to revive the hearts of the afflicted with benefits, and to pour as many blessings on our fellow-creatures as the dew sheds upon the earth.

LESSON LXXIII. TWENTY-FIFTH WEEK.

LIFE AND LABOURS OF THE BEE.

IN the fine days of the summer, in that time of cheerfulness and joy, every thing is in motion; every thing throughout the animal world is full of life and activity; but there are no creatures so active as the little republic of bees. At least, of all the insects round us, there are none we can better learn to be acquainted with, or which can afford a more pleasing scene. The bees assemble in great numbers, either in hollow trees and cavities, or in a sort of baskets, called hives, where they are collected by the art of man. They disperse on all sides, and, by means of their trunk, they gather honey and wax from the stamina and juice of the flowers. When their harvest is made, they convey it into their storehouse, which they fill from top to bottom with cells in form of hexagons. They inhabit some of these cells; others are designed to receive the eggs, and to lodge their young; and the rest serve as magazines to deposit their winter's provision of honey in. Amongst these bees, which form altogether but one family, there is one larger than any other, which is a female, and therefore called their Queen. To her alone all the young bees born in a hive owe their birth. From the eggs she laid in the cells there come out worms, which the working bees feed with their trunks. Afterwards this worm remains near fifteen days to all appearance dead in its cell, which is closed with a little wax lid. In this inanimate state it is called nympha. When its time is accomplished, it opens its tomb, and comes out in the form of a young bee. The bees have two horns on their heads, which guard their eyes, and warn them of dangers. They have fangs or claws they make use of in their work, and a trunk, or hollow tube, which they can draw in and out of its case as they please. This instrument, supple and movable in every way, reaches to the very bottom of the cup of the flowers, where they gather their honey, and passes through the case into the bag of honey placed within their bodies, from whence the honey is afterwards poured into the cells of the storehouse. The bees have six feet; with the two first, and their fangs, they form the wax or meal of the flowers into little balls; and with their middle feet they put them into a hollow, shaped like a spoon, which they have in their hind feet, which are also furnished with hair, in order to retain the wax, and prevent it from falling when they are flying. Laden thus they return to their cell, without losing their way, though they are sometimes several miles from it. When they arrive, they find other bees waiting for them, to assist them in unloading their booty, and then they all work in common to employ those provisions for the general use of the hive. They stop every crevice with wax, to keep out any foreign animal; but leave openings for themselves to go in and out. The queen, and the working bees have, at the extremity of the body, a sting enclosed in a case, which they make use of to wound or kill their enemies: but the wound they give is generally fatal to themselves, when the sting is drawn from their body.

Every thing in those little animals must excite our admiration; the formation of their limbs, so regular and so well adapted to their kind of life; the care they take of their young; the art with which their cells are built, their activity, their industry, and intelligence. Let us never pass by a bee-hive with indifference. Let us admire them, and this admiration may lead us to more sublime thoughts. If we love to reflect on our Creator, we shall find him here. This interesting scene will lead us to him; and we shall adore his wisdom, his power, and his goodness, in the production of these little creatures.

LESSON LXXIV.

CATERPILLARS.

THOUGH these insects are so disagreeable to the lovers of gardens, they nevertheless deserve our attention. Caterpillars generally live upon our trees, and we have such an aversion to them, that wherever we meet with them we destroy them. This is the reason we do not deign to honour them with a look, and still less to examine them attentively. And yet there is no doubt but these insects may very agreeably amuse an attentive observer of nature. Let us here try to prove it. Perhaps, by raising the curiosity of those who have hitherto neglected them, they may be induced not to trample them under foot, without first observing their wonderful formation, and taking from thence occasion to look up to the Creator. The number of species of caterpillars already known amounts to more than three hundred, and there are new ones daily discovered. Their shape, their colour, their form, their inclinations, and way of life, all differ in some respects; but this circumstance they have in common, that they are composed of rings, which, by moving to and fro, carry the body wherever they want to go. Nature has given them two sorts of feet, which have each their particular use. The six fore-feet are a sort of hooks, which they make use of in taking a fast hold and clinging to any thing. The soles of the hinder-feet are broad, and armed with little sharp nails. With the hooks they draw to them the leaves, the grass, and whatever they want for food, and they fix the fore-part of their body with them while they are drawing up the hind rings. The hinder-feet serve to keep them firm, and to hold by whatever they are to rest upon. When they are on a branch or a leaf, they can seize on food at some distance; for by hooking themselves on with the hind-feet, they stand up, and raise the fore-part of their body, move it about, and poise it in the air on every side, get considerably upon the leaf, reach their food, and take it with their claws. However adapted the body of the caterpillar is to its several wants, it is remarkable that its state is but transient, that the limbs last but a certain time, and that this creeping worm becomes a chrysalis without feet or motion, till it is metamorphosed into a creature classing with the inhabitants of the air. Were it for this reason only, the caterpillars would be worth our attention. Towards the end of summer, and often sooner, after having satiated themselves with verdure, and after having changed their coat several times, they cease to eat, and begin to build a house, in order to end their life in it, with the caterpillar state, and to be afterwards transformed into butterflies. The chrysalis is full of a sort of thick milk, which serves for food to the butterfly till it comes out. When it is entirely formed, and it parts arrived at consistency, and that a gentle warmth invites it to quit its prison, it makes itself a passage through the end of the chrysalis that is largest and the thinnest. The head (which has always been turned towards that end) disengages itself, the horns lengthen, the feet and wings spread out, the butterfly takes wing and flies away. It preserves none of its former state. The caterpillar which changed into the chrysalis, and the butterfly that comes out of it, are two animals totally different. The former is rough, hairy, and limits itself to a gross food; but the other is adorned with the liveliest colours, and goes from flower to flower, freely enjoying all nature, of which it is itself the ornament. Will not this description reconcile every one to these insects, and put an end to all aversion to them. Perhaps some may still think they have a right to ask, To what purpose, after all, are these caterpillars? Would it not be better to be entirely free from them? No; on the contrary, it is certain, that the world would not be as perfect as it is, if there were no caterpillars in it. Take away these insects, and you deprive the birds of a considerable part of their subsistence. As the birds were to feed on caterpillars, it was just that the Creator should ordain for their food the leaves and plants, to which they have as good a right as us. It is true that the voracity of these animals makes them sometimes troublesome to mankind; but this is an evil which the Creator permits with much wisdom. For the mischief the caterpillars sometimes do, may serve to humble us, and make us recollect the uncertainty of all our earthly possessions. And even supposing we could not penetrate into the reasons for forming such creatures, we should not therefore have a right to deny their utility. We ought, on the contrary, to take occasion from thence to acknowledge our ignorance, and trust in the wisdom of Him who formed all things.

LESSON LXXV.

THE NIGHTINGALE.

THE nightingale is a musician of the first rank amongst the inhabitants of the air. When all the birds, who during day entertained us with their notes, cease to be heard, it is then that the voice of the nightingale is raised to animate the woods and groves. When we listen to the brilliant sounds of that voice, we are apt to conclude, that the bird must be large, that the throat must have great strength; and the inimitable charm of her melodious notes makes us presume she surpasses all others in the beauty of her form. But it would be to no purpose to seek these advantages in the nightingale; it is a bird of poor appearance, whose colour, form, and the whole of its exterior, is void of any thing attractive or majestic, and has nothing in the least distinguishing. Nature has, however, compensated for its plainness, by giving it a voice irresistibly charming. Listen to its fine long quivering notes: what variety, sweetness, and brilliancy in them! When she begins her song, she seems to study and compose beforehand the melodious notes she wishes to be heard. She begins softly; then the notes swell gradually till they run with the rapidity of a torrent: she goes from serious to gay: from simple notes to the wildest warblings; and has, throughout the whole, the art to please the ear.

This bird may give rise to many useful and edifying reflections; we may learn this truth from it, that homeliness of body is sometimes united with very estimable qualities, and does not exclude beauty from the soul. How unjust then are those who, only attaching themselves to the features of the face, and to exterior qualities, praise or blame nothing but what strikes their senses, and despise those who have bodily defects. Let us learn to judge with more equity. Any man, though deprived of the advantage of figure and fortune, who proves himself by his conduct to have the soul of a sage or a saint, is by much the more worthy of our esteem. It is the perfection of the soul only that gives true merit to man, or is worthy our admiration; the rest can only seduce those who do not know the value of wisdom and virtue. Have we not often known persons, neither distinguished by rank nor exterior qualities, who have done the greatest services to mankind, and have often shown more greatness of soul, than others possessed of the most beautiful person and finest form. It is a lesson not to trust to appearances. Those we despise may often prove to be superior to ourselves.

LESSON LXXVI. TWENTY-SIXTH WEEK.

THE PLEASURES WHICH SUMMER AFFORDS TO OUR SENSES.

SUMMER has inexpressible charms, and gives us daily proofs of the infinite beneficence of our Creator; it is the happy season in which he pours out the treasures of his blessings in the greatest abundance on every living creature. Nature, after having revived us with the pleasures of spring, is continually employed, all the summer, in providing for us every thing to please our senses, to make our subsistence easy, to satisfy our wants, and awaken in our hearts just sentiments of gratitude. Before our eyes there grows, by virtue of the secret laws of nature, an innumerable quantity of fruit in the fields and gardens: fruits which, after having pleased the sight, may be gathered and preserved for our food. The flowers afford the most agreeable variety to our senses; we admire their rich dress, and the inexhaustible fertility of nature in the multiplicity of their species. What variety and beauty also in the plants, from the humble moss to the stately oak! Let us climb the highest mountain, seek the cool shade of the woods, or descend into the valley, we shall every where find new beauties. A multitude of objects strike our eyes at once, all different from each other; but each in itself has charms enough to fix our attention. There we see innumerable flowers; here living creatures of different kinds. If we lift up our eyes, they are delighted with the blue sky; if we cast them on the ground, they are refreshed by the beautiful verdure with which it is clothed. Our ear is charmed with the cheerful notes of the winged songsters; the variety and simplicity of their melody fills the soul with the sweetest sensations. The murmuring of the brooks, and the silver waves of a fine flowing river, also please the ear and eye. It is to indulge our taste that the strawberries and other pleasant fruit ripen; while at the same time they cool the blood. Our barns and granaries are filled with the new productions of the fields and gardens, which afford us wholesome agreeable food. The smell is struck with the sweet perfume that exhales on every side. A number of pleasing objects affect the senses, and raise our sensibility. Numerous flocks feed on the profusion of bountiful nature, to procure us pleasant and wholesome milk and nourishing meats. Abundant rains moisten the ground, and open to us new sources of blessings. Tufted trees and groves afford us a delightful shade. All that we see and hear, all that taste or smell can convey, increases our pleasures, and contributes to our happiness. But the creation is a still greater and more enchanting object for the mind than for the senses. In points which the latter cannot reach, the mind discovers beauty, harmony, variety, and new pleasures.

LESSON LXXVII.

ECLIPSES OF THE SUN AND MOON.

IT is admirable, that, in an age so enlightened as ours, not only the multitude, but even those who pretend to be superior to the common people, should be still so ignorant in respect to those bodies. From thence proceed the superstitious notions which are raised by eclipses of the sun and moon. If any one took the trouble to enquire into the cause of them, it would be found how absurd it is to shut up wells during an eclipse, to prevent the water from acquiring any hurtful quality, or to take other superstitious precautions, which are melancholy proofs of the ignorance and want of piety in mankind. Let us, then, examine into this phenomenon, because it is in itself very remarkable, and furnishes us with a new occasion to glorify our great Creator. The eclipse of the sun is an effect entirely natural; it is caused by the moon passing between the earth and the sun. But it can only take place when the moon, which is an opaque body, and dark in itself, comes nearly in a direct line between the sun and our earth. It then conceals from us part of that globe, or the whole of it. The former is called, in the almanacks, a partial eclipse; the latter, a total eclipse. Thus the solar eclipse is nothing more than the situation of the earth when the moon passes between it and the sun, interrupting the solar rays. We must not imagine that the sun is at that time really darkened. It is only concealed from us. It retains its usual splendour; and all the difference is, that the rays which issue from it cannot reach us, because the moon is placed between the sun and our globe. This is the reason that a solar eclipse is never visible at the same time in all parts of our earth; for, unless the sun had really lost its light, the eclipse could not be visible at the same time in every point of the hemisphere. It is, on the contrary, always more in one country than in another, and in some places it is never seen at any time. The moon not only darkens our earth sometimes, but the latter also casts it shade upon the moon, and by that means intercepts the rays of the sun from it, either wholly or in part; and this is called an eclipse of the moon: but it can only be when the moon is at one side of the earth, and the sun at the opposite side, and consequently when it is full moon. As that planet is really darkened by the shadow of the earth, the eclipse is perceived at the same time on all the points of an hemisphere of our globe. Some people may ask, what is the use of eclipses of the sun and moon? To those even who only calculate the use of natural things from the immediate advantage that accrues to them, the eclipses are of importance. It is by their means that the true position and distance of towns and countries are known; and it is from thence that we have been able to trace accurately the geographical maps of the most remote countries. Eclipses, if well observed, serve also to confirm chronology, and to direct the navigator, by showing him how far he is from the east or west.

However inattentive we may be to the importance of these advantages, they are not the less essential to us.

LESSON LXXVIII.

THE STALK OF THE WHEAT.

WE see that the wheat is growing every day, that the tender ears of corn are insensibly ripening, in order to furnish us, some weeks hence, with wholesome bread: a precious blessing with which nature rewards the labours of man. Let us cast our eyes on a field of wheat; and calculate the millions of ears of corn which cover one single field; and let us reflect on the wisdom of those laws which procure such an abundance for us. How many preparatives were necessary to furnish us with this most indispensable of all food! How many progressive changes were to take place in nature before an ear of corn could spring up! It is now almost ready to produce its fruit, and invites us to reflect on its construction. When the grain of wheat has been some time in the ground, it shoots upwards a stalk, which rises perpendicularly, but grows slowly, that the wheat may have time to ripen. It is for very wise reasons that it grows four or five feet high, in order to preserve the grain from the moisture of the ground, which would rot it. The height of the stalk contributes also to the depuration of the nourishing juices which the root conveys to it; and its round form assists this operation; for by that means the heat penetrates equally into every part of the stem. But how is it possible that so slender a stalk can support itself, and bear up its fruitful head without sinking under the weight, or without being beat down by a breath of wind? The Creator guarded against this inconvenience in the formation of the stem. He furnished it with four very strong knots, which in some measure serve as screws, strengthening it without taking from it the power of bending. The construction of these knots alone show the greatest wisdom. Like a very fine sieve, they are full of little holes, and through these orifices the juices rise up, and the heat of the sun penetrates into them. The heat attenuates the juices which collect there, and purifies them, by making them pass through a sort of sieve. The stalk is liable to be beat down by storms and heavy showers of rain, but its not being thick secures it. It is flexible enough to bend without breaking.

From the chief stem there shoot others not so high, as well as leaves, which collecting drops of dew and rain, furnish the plant with the nutritive juices it requires. In the mean time, the grain, that essential part of the plant, forms itself by degrees. To preserve these tender sprouts from the accidents and dangers which might destroy them at the instant of their birth, the two upper leaves of the stalk unite closely at the top, both to preserve the ear of corn, and to draw to it the nourishing juices. But as soon as the stem is formed enough to supply the grain of itself with proper juices, the leaves gradually dry and drop off, that none may be taken from the fruit, and that the root may have nothing more than is necessary to nourish it. The bearded corn waves gracefully, and its points serve for ornament, as well as defence against the birds. Refreshed with gentle rains, it thrives till the appointed time, and grows every day more yellow, till, sinking at last under the weight of its riches, it bends its head to the sickle.

What wonderful wisdom and power appear in the construction of one single stalk of wheat, and yet we seldom pay attention to it, because it is daily before our eyes. But what other proof of goodness can the Creator give us, if we are insensible to this. O man! open thy heart to the sweet sensations of gratitude and joy:

learn to think as a man, to enjoy the noblest pleasure a mortal is capable of in this world, that of tracing thy Creator in every creature.

LESSON LXXIX. TWENTY-SEVENTH WEEK.

FOREIGN PLANTS.

ALL our corn, and a great number of our vegetables, come from foreign countries, and generally from warmer climates than ours; most of them from Italy; Italy got them from Greece, and Greece had them from the east. When America was discovered, a great number of plants and flowers were found there, which were till then unknown, and which have since been transplanted into Europe with much success. The English still take a great deal of trouble, at this time, to cultivate the North American plants in their country. Most of the different sorts of corn, of which men and animals make their best food, are grass plants; but though our fields are now covered with them, they are foreign to us. Rye and wheat are indigenous in Little Tartary and Siberia, where they still grow without culture. As for barley and oats we are ignorant indeed from whence they come, but it is certain they are not indigenous in our climate, or it would not be necessary to cultivate them. Rice is the produce of Ethiopia. Since the beginning of this century, it has been cultivated also in America; and they now send us from thence, every year, vessels entirely laden with those useful seeds.—

The buck-wheat comes originally from Asia; the Crusades introduced it into Italy, from whence it came into Germany. Most of our herbage and vegetables also have a foreign origin. Borage comes from Syria, cresses from Crete, cauliflower from Cyprus, and asparagus from Asia. We are indebted to Italy for the chervil. Aneth comes from Portugal and Spain, fennel from the Canary-Islands, anise and parsley from Egypt, garlic is the produce of the east, shallots come from Siberia, and horse-radish from China. We owe the kidney-beans to the East-Indies, the gourds to Astracan, the lentils to France, the potatoes to Brazil. The Spaniards found tobacco at Tobacco, a province of Jucatan in America. The ornaments of our gardens, the most beautiful flowers, many of them are foreign productions Jessamine comes from the East-Indies, the elder-tree from Persia, the tulip from Cappadocia, the narcissus from Italy, the lily from Syria, the tube-rose from Java and Ceylon, the carnation and pink from Italy, the aster from China, &c.

With what goodness does God thus provide for our happiness and enjoyment, by making even the most remote countries contribute towards it! But let us, at the same time, learn the constitution of the globe which we inhabit. There is an universal transmigration over all the earth: men, animals, and vegetables, transplant themselves, and go from one region to another, and this transmigration will only end with our globe.

LESSON LXXX.

THE SILK-WORM.

THE race of caterpillars, which divide into two generals classes (those of nocturnal and diurnal butterflies) have also different families among them, each of which has its distinct character and properties. The name of silk-worm is given to one of these: this caterpillar, like the others, is composed of several moveable rings, and is well furnished with feet and claws to rest and fix itself where it pleases. It has two rows of teeth, which do not move up and down like ours, but from right to left; in order to press, cut, and tear the leaves every way. We may see through its skin a vessel the whole length of its back, which swells every now and then, and performs the function of the heart. This worm has nine orifices on each side, which correspond with so many lungs, and assist the circulation of the nutritive juice. Under the mouth it has a kind of reel, with two holes, through which it puts out two drops of the gum with which its bag is filled. They are like two distaffs, continually supplying the materials for making its thread. The gum which runs through the two holes, takes that form, and lengthens into a double thread, which loses suddenly its fluidity, and acquires the consistence necessary to support or to contain the worm. When it is time to be enclosed in it, it joins the two threads together, gluing them one over another with its fore-feet. This double thread is not only very fine, but also very strong, and of an astonishing length. Each silk-worm's bag has a silk thread near as long as 500 ells; and as this thread is double, and all along joined together, each bag must contain 1000 ells of silk, though the whole together does not weigh above two grains and a half. The life of this insect, while it is still a worm, is very short; and yet it passes through different states, which insensibly bring it to perfection. At the first coming out of the egg, it is extremely small, perfectly black, and its head is still a finer black than the rest of its body. Some days after, it begins to grow whitish, or of a dark grey colour. Its coat then becomes ragged and dirty. It throws it off, and appears in a new dress. It becomes large, and much whiter, but rather tinged with green, as it feeds on green leaves. After a few days, more or less, according to the degree of heat, and quality of its food and constitution, it ceases to eat. It goes to sleep for about two days; then works and frets itself extremely. It becomes almost red with the efforts it makes. Its skin wrinkles and shrivels up. It throws it off a second time, and with it casts away its feet. Behold it new dressed three times in the space of three weeks or a month. It begins again to eat, and might then pass for a different creature, so unlike in head, colour, and form, to what it was before. After having again eaten for some days, it falls again into a lethargy, in recovering from which it changes once more its coat. That is the third skin it has thrown off since it came out of the shell. It still continues to eat some time, then renouncing all food, it prepares itself a retreat; and draws out of its body a silk thread, which it wraps round itself much as we wind thread round an oval piece of wood: this consists of extreme fine silken threads. It rests quietly in the bag it has spun for itself, until the end of a fortnight, when it would break through, and make its way out, if it was not prevented by putting it into an oven or hot sun, in order to kill it. These silk bags are thrown into hot water, and stirred about with birch twigs, to loosen the ends of the silk, which are afterwards wound on reels made for the purpose.

Thus it is to a worm, or a caterpillar, that we owe the luxury of our clothing. This reflection ought to humble us. Can we be vain of the silk with which we are covered, when we consider to what we owe it, and how little we ourselves contribute towards it! Let us reflect, that even the most despicable things have been created for the advantage and use of mankind. A worm, which we scarce deign to look at, becomes a blessing to whole provinces, a considerable object of trade, and a source of riches.

LESSON LXXXI.

THE RAINBOW.

WHEN the sun reflects its rays on drops of water which fall from the clouds, and we are placed with our backs to the sun, and with the clouds opposite to us, we observe a rainbow. We may consider the drops of rain as little transparent balls, on which the rays fall and are refracted. From thence proceed the colours in the rainbow. They are seven in number, and in the following order: red, orange, yellow, green, blue, purple, and violet. These colours appear so much the more lively, according as the cloud behind is darker, and the drops of rain fall the closer. The drops falling continually produce a new rainbow every moment, and as each spectator has his particular situation, from whence he observes this phenomenon, it so happens, that two men cannot, properly speaking, see the same rainbow. This meteor can only last while the rain continues to fall. To consider a rainbow merely as a phenomenon of nature, it is one of the finest sights imaginable. It is a picture the most beautifully coloured of any the Creator has given us. But when we reflect, that God has made this meteor a sign of his pardon, and of the covenant he vouchsafed to make with mankind, we find subject for more than one edifying reflection. There cannot be a rainbow when it rains over the whole horizon. Every time, then, that this beautiful meteor appears, we may be certain that we have no deluge to apprehend, as in a deluge it must rain violently from every part of the sky. Thus, when the sky is only covered with clouds on one side, and the sun appears on the other, it is a sign that these dark clouds will disperse, and that the sky will soon become serene. This is also the reason why we cannot see a rainbow unless the sun is behind us, and the rain opposite to us. The sun and rain must appear at the same time in order to form a rainbow. No colours would be seen if the sky was too light; therefore, where it appears, the horizon must be covered with dark clouds. Neither could the colours in the rainbow exist without the refraction of the rays of the sun upon it.

LESSON LXXXII. TWENTY-EIGHTH WEEK.

THE BIRDS' NESTS.

THE construction of the birds' nests discovers many curious objects, which cannot be indifferent to a reflecting mind, desirous of information. Who is there that would not admire those regular little edifices, composed of so many different materials, collected and put in order with so much care and judgment, constructed with such industry, elegance, and neatness, without any other tool than a bill and two claws. It is not so wonderful, that men can erect great buildings according to the rules of art, when we consider, that the artists are endowed with reason, and have abundance of tools and materials for it. But that a bird, unprovided with any thing for the purpose except its bill and claws, should be capable of uniting so much regularity, solidity, and judgment, in the construction of its nest, is what we can never too much admire. Nothing is more wonderful than the nest of a goldfinch. The inside of it is lined with cotton, wool, and fine silky threads. The outside is woven with thick moss, the colour of which resembles the bark of the tree on which the nest is laid, in order that it should be less observed and exposed to the eyes of passengers. There are some nests, in which the hair, the down, and the straw, are curiously laid across and interwoven. There are others, wherein all the parts are neatly joined and tied together with a thread, which the bird makes for itself, of flax, tow, and horse-hair, and more generally of spiders' webs. The blackbird and lapwing plaister over the inside of their nest with a thin coat of mortar, which cements and keeps together all the bottom parts; and then, while it is fresh, they stick some moss to it, in order to make it warm and close. The swallow's nest is of a different construction from the rest. They neither require sticks, straws, nor ligaments; they know how to compose a sort of cement, with which they make themselves nests, perfectly secure, neat, and convenient. Their method of moistening this cement is by going frequently to dip their breasts into the water, and then shaking it off upon it, till it is thoroughly steeped, after which they work it up together with their bills. But the most extraordinary of all the nests are those which certain Indian birds suspend with great art upon the branches of trees, in order to secure themselves from the pursuit of several animals and insects. In general, each species of birds has its particular manner of placing its nest. Some build them on houses, others on trees; some under the grass, others in the ground; but all in the manner best adapted for their security, the bringing up their young, and the preservation of their species.

Is it not clear, that in all their work birds propose to themselves certain designs? They make the nest hollow, almost like the half of a globe, in order that the heat may the better concentre there. The outside of the nest is covered with materials more or less coarse, not only to serve as a foundation, but to keep out the wind and the insects. The inside is lined with more delicate materials, such as wool and down, to make it soft and warm for their young ones to lie on. Is it not a kind of reason, which teaches the bird to place its nest so as to be sheltered from rain, and to be out of the reach of destructive animals? Where do they learn they are to have eggs, and that these eggs would require nests to prevent them from falling, and to keep them warm? that the heat would not concentre round the eggs if the nest was larger; nor hold all the young ones if it was smaller? How do they know the proper size of the nest, and the number of young that are to be born? Who teaches them not to mistake the time, and to calculate so exactly, that they never lay their eggs before the nest is finished? Nothing that has been hitherto said in answer to these questions is satisfactory. But of what nature soever these faculties of the birds may be, they are certainly the effects of a superior power and wisdom.

LESSON LXXXIII.

REFLECTIONS ON A FLOWER-GARDEN.

SEE and behold the flower-garden, and reflect on the number of different beauties assembled together in this little space. The art and industry of man have made it a beautiful scene of the finest flowers. But what would it have been without care and culture? A wild desart full of thistles and thorns.—Such would youth be, if not properly educated. But when they receive useful instructions, and are under wise direction, they are like lovely blossoms, which delight with their beauty, and will soon produce fruit beneficial to society. Behold the night violet or the julian flower, which towards evening scents our gardens with its perfume, in which it is superior to all others: but it has no beauty. It is scarcely like a flower. It is little, and of a grey colour, tinged with green, so that it can scarcely be distinguished from the leaves. Modest, without show or pretensions, it perfumes the whole garden, although it is not observed in the multitude; it is like a person who has much sense, and whom nature has compensated for the want of beauty by more solid endowments. The righteous man often does good in secret and in obscurity, and sheds around him the perfume of good works; but when we wish to be acquainted with this beneficent man, we find that there is nothing of distinction either in his person, condition, or rank. —In the carnation, beauty and perfume are both united; and it is certainly the most perfect of all flowers. It almost equals the tulip in its colours, and it surpasses it in the multitude of its leaves, and the elegance of its form. This flower is the emblem of a person who possesses both sense and beauty, and knows how to conciliate the love and respect of his fellow-creatures.—Let us now observe the rose, its colour, form, perfume, every thing in this flower charms us. But it appears to be the slightest and most frail of any, and soon loses the beauty which distinguishes it from other flowers. This is a useful lesson for those who shine only in beauty; and it ought to teach them not to be vain of their charms, or trust too much in them.

LESSON LXXXIV.

THE ANTS.

THE ants, as well as the bees, may be considered as a little commonwealth, which has its peculiar government, laws, and police. They live in a sort of town, divided into several streets which lead to different magazines. Their activity and industry, in collecting and using the materials they require for their nest, is admirable. They all join in digging the earth together, and in carrying it home. They collect a great quantity of grass, straw, wood, &c. of which they make a heap. It appears at first sight very irregularly formed; but through all this apparent disorder, much art may be discovered, when examined more attentively. Under the domes, or little hills which cover them, and which are always so formed as to let the water run off, there are galleries which communicate with one another, and may be considered as the streets of this little city. But what is particularly admirable, is the care which the ants take of their eggs, and of the worms when they come out of the chrysalis when formed. They convey them carefully from one place to another. They feed their young, and remove with the tenderest solicitude every thing that might hurt them. They even attend to preserving a proper degree of warmth about them. Their painful labours in summer-time, when heaping up provisions, have scarcely any object but the support of their young, as they themselves require no food in winter, being asleep or insensible till spring. As soon as their young are out of the egg, they employ themselves in feeding them; and it still costs them more trouble. They generally have several houses, and they convey their young from one habitation, to some other which they wish to people. According as the weather is hot or cold, dry or rainy, they bring their chrysalis near the surface of the earth, or remove them from it. They bring them to the surface in mild weather, and even sometimes after rain lay them in a bright sun, or after a long drought in a gentle dew. But at the approach of night, rain, or cold, they take up their little ones in their paws, and carry them so low down in the earth, that it is sometimes necessary to dig above a foot deep in order to find them. There are several sorts of these insects: the wood-ants never lie but in forests or bushes, and do no harm to fields. There are two species of these, the red and the black. Some settle in the ground in dry soils, and generally choose places where they find roots of fir-trees or birch, to make their habitations. Others live on old trunks of trees above ground, high enough to be out of the reach of its moisture. They make themselves apartments in the cavities of the trunk, and cover them with straw and other things, to shelter them from snow or rain. The field-ants are also both black and red as well as the others, but they are smaller. They settle either in the corn or the field. When the weather is dry, they bury themselves pretty deep; but as soon as it becomes rainy, they raise their habitations higher and higher, according as there is more or less damp; and when it abates, they never fail of returning to their subterraneous apartments. It is also to be observed, that the ants acquire wings; and that towards autumn they are seen to fly in swarms over ditches and other water. But are these mischievous insects worthy our attention, spoiling, as they do, our fields and meadows? By their subterraneous works, they make the ground hollow, tear it up, and prevent the plants and roots from growing. They are enemies to the bees and silkworms; and are supposed to hurt the flowers, and particularly the young trees. It is said, they devour the buds and shoots; and that, getting under the bark of trees, they gnaw them to the quick. For this reason, the ants are destroyed wherever there are found. If the ants gathered honey, though at the expence of a million of other creatures, they would be highly valued; but because their labours hurt some useful plants, we think ourselves authorised to destroy them. Suppose that in reality they do us some harm, are they therefore less worthy our attention? Do none deserve our observation, but such as are useful to us? Let us banish this prejudice. Even the ants may afford us instruction and amusement. The form of their limbs, their industry, their indefatigable labour, the police of their republic, their tender care of their young, and perhaps a number of other qualities, which we are not acquainted with, might convince us of the wisdom of that great Being who is their Creator as well as ours.

LESSON LXXXV. TWENTY-NINTH WEEK.

THE HAIL.

HAIL is drops of rain, which freezing in the air, fall in pieces of an oblong or angular form. It appears extraordinary, that, in the very warmest seasons of the year, vapours should freeze in the atmosphere. We may consider, that even in the greatest heats the upper region of the air is cold to a sensible degree, and full of snow. If it were not so, how could the highest mountains remain the whole summer covered with snow. In the hottest parts of America, it is so severely cold on the highest mountains, that there is continual danger of being frozen; and of course it would snow from this extreme cold in the upper region of the atmosphere in the very middle of summer, if the snow did not melt in falling before it reaches the ground. But when these particles of snow collect together, the drops begin to freeze; and as in falling they go rapidly through warmer regions of the air, it happens, that before this warmth can have penetrated through them, their cold increases, so as to be entirely frozen. It might be imagined, that the cold, on the contrary, ought to abate in proportion as they pass through a warmer air. But what is the consequence in winter, when cold water, which has been exposed to the outward air, is brought into a very hot room? It freezes and becomes ice, which would not have happened if it had been put into a cold room.

This is precisely the case in respect to the hail. When cold bodies pass suddenly into hot air, their cold increases to such a degree, as to turn to ice. The volatile salts, more or less dispersed through our atmosphere, contribute much to this. We must not therefore be surprised that storms are not always attended with hail, as it requires great abundance of saline vapours to occasion the sudden freezing of the drops of water. Though hail is more frequent in summer-time, it falls also in other seasons: for, as in every part of the year the saline exhalations may ferment in the atmosphere, so it may hail in winter, autumn, or spring. The hailstones are sometimes round, at other times concave, and often angular. The difference we observe in the form and size of hailstones may proceed from many accidental causes; particularly the violent winds that cross one another, certainly contribute much towards it. A hail-stone may also in its fall meet several other cold particles, which considerably increase its size; and often the small hailstones meet others, and in joining together form large ones. It is certain, that when the hail is very large, it does great mischief to the vintage and harvest, fruit, &c. If the violence of a hail-storm sometimes lays waste acres of land, this mischief, however great it may be, is nothing in comparison of the advantages which accrue from it; the hail evidently cools the air in the burning heats of summer; and it is very remarkable, that this apparent disorder never fails to produce fertility.

Here then, we may see the goodness and wisdom of Him, who in the midst of storms worketh admirable things, and never ceases to enrich and fertilize the earth.

LESSON LXXXVI.

THE EARTH AND ITS ORIGINAL CONSTITUTION.

THE great Creator has made the earth of a proper nature for the production and growth of herbs, plants, and trees. It is compact enough to contain and hold the vegetables, so firm that the wind does not blow them down; and yet it is light and moveable enough for the plants to extend their roots in it, and draw out the moisture and nutritive juices. And that all sorts of vegetables should grow and draw subsistence from the earth, we find it composed of several sorts of soil, which serve for other purposes also; such as potter's earth, clay, chalk, and gravel. Some serve to make bricks, others to build with, and some to make earthen ware. There are also kinds of earth which are made use of in dyeing colours, and even in medicine. The unevenness of the ground has many advantages: a great number, and a great variety, of animals and plants, may live on mountains; these serve to break the violence of the winds; they produce a great variety of wholesome plants and fruit, which would not do well in plains. They contain in their cavities the minerals and metals so useful to us: from them proceed the springs, and most of the rivers produced by the melting of the snow, by rain, and other vapours. The stones that are under ground serve to build walls, to make lime and glass. As to the metals, their uses are numberless: let us only think of the many tools our workmen and artists require: the utensils and furniture of every sort made of them, which furnish us with so many conveniences and ornaments. We also draw considerable advantages from the hardness and weight of those bodies. Nobody is ignorant of the use of minerals. Salt serves to season our food, and to keep it from corrupting. The sulphureous particles of bodies render them combustible. Even volcanos and earthquakes, whatever mischief they sometimes do, are still useful and necessary. If the fire did not consume the sulphureous exhalations, they would spread too much in the air, and make it unwholesome; many warm baths could not exist; and many minerals and metals would never be produced. It is to our ignorance we should impute it, if there are so many things of which we do not see the use. In order to judge of the works of the Lord, and to acknowledge the wisdom of them, they must not be considered only in one point of view, but taken in the whole. Many things which we think hurtful, are notwithstanding certainly of use. Others appear superfluous; and yet, if they were wanting they would leave a void in the plan of the creation. How many things appear to us insignificant, only because we do not know the real use of them! Put a loadstone into the hands of a man who does not know its virtue, and he will scarce deign to look at it; but tell him that we owe to that stone the progress of navigation, and the discovery of a new world, and he will then be of a very different opinion. It is the same with respect to many things which we despise, or judge ill of, because we do not know the use of them, nor see the connexion they have with the whole.

LESSON LXXXVII.

ON THE PHASES OR APPEARANCES OF THE MOON.

ALL observation confirms to us that the moon has a particular motion of turning round the earth from west to east: for after having placed itself between us and the sun, it retires from under that body, and continues to go back towards the east, changing from day to day the place of rising. At the end of fifteen days it will have reached the most eastern part of the horizon at the time the sun sets with us. It is then in opposition. In the evening it rises above our horizon when the sun retires below it, and it sets in the morning about the time the sun rises. If then it continues to describe the circle which it has half finished round the earth, it removes visibly from its point opposite to the sun; it will draw nearer to the sun, and will appear later than when in opposition, till by degrees it will only be seen a little before sun-rise. The revolution of the moon round the earth explains why it rises and sets at such different times, and why its phases are so various, and yet so regular. A globe illuminated by the sun, or by a flambeau, can only receive the light directly on one side: so, at first-sight, we perceive that the moon is a globe which receives its light from the sun.—When, therefore, it is in conjunction, that is to say, placed between the sun and us, it turns all its illuminated side towards the sun, and its dark side towards us, and is then of course invisible. It rises and sets with the sun in the same region of the sky.

This is what we call new moon, or the conjunction. But when the moon retires from under the sun, and goes back towards the east, it has then no longer all its dark side turned towards us: a small part of it, a little border of the lighted half begins to appear. This illumined border we see on the right side towards sun-set, or even before it. The horns of this crescent turn to the left, or facing the east. The further the moon removes from the sun, the more visible it becomes to us. At the end of seven days, when it has reached a quarter of its course round the earth, it discovers more and more of its illumined side, till it shows us half of it. The light part is then turned towards the sun, and the dark part casts no light on us. Exactly half the moon is then illuminated. The half of that half can only be the quarter of the whole globe, and it is in reality this quarter which appears to us. The moon is then in its first quarter. By degrees, as the moon removes from the sun, and as the earth comes between them, the more of that part of the moon which faces us becomes light. At the end of seven days, reckoning from the first quarter, it is almost directly opposite to the sun, and then its whole illumined disk presents itself to us. It then rises in the east, exactly at the moment the sun sets in the west, and we have a full moon. Next day the lighted half is already a little turned from us, and we no longer see it all. The light gradually leaves the western side, extending itself in proportion on the half not facing the earth. This is the decrease of the moon, and the more it goes foward, the more the dark side increases, till at last half the dark side is turned towards the earth, and consequently half the light side. It has then the form of a half circle, and is what we call the last quarter.

By the admirable harmony which subsists between the motion of this planet on its own axis, and its course round the sun, it so happens, that the moon still shows us the same half a globe which it has shown since the beginning of the world. During so many thousands of years, this globe has constantly, and without deviating from the same course, finished its revolution in 27 days and eight hours. Regularly, and at the same periods, it has lighted sometimes our nights, and sometimes those of remote countries. With how much goodness has it pleased Divine Wisdom to grant to our earth a faithful companion to light almost half our nights! Alas! we are not properly sensible of the value of this wise plan of the Creator.

LESSON LXXXVIII. THIRTIETH WEEK.

MINERAL WATERS.

WHETHER we consider mineral waters in respect to their formation, or the benefit that accrues to us from them, they are certainly valuable blessings bestowed upon us. But even the places where these salutary springs flow are seldom what they ought to be, places consecrated to praise and gratitude towards Heaven. Let the following reflections make us more grateful to our Heavenly Benefactor: in the first place, are not the springs from whence we draw the common salt to season our food, worthy our attention? It is probable that these springs originate from the mineral salt, which the waters dissolve under ground.

The mineral hot baths are not less remarkable: there is so great a number of them, that in Germany alone they reckon about six score, and they are also so hot, that it is necessary to let the water cool for twelve, and sometimes eighteen hours, before they are fit to bathe in. What is the cause of this extraordinary heat? It certainly is not the sun; for if it were, the waters would only preserve their heat in the day-time when the sun shines, and they would grow cold in the night or in winter. Neither can it be attributed to subterraneous fires; for then it would still be necessary to account for the medicinal virtue of these baths. The most simple cause we can give is this, that the waters passing through ground, mixed with sulphur, fire-stones, and metals, acquire this degree of heat. When the water falls on those quarries, the sulphureous and ferruginous particles which it dissolves, heat and take fire by the friction and re-action of their principles, and communicate this heat to the water. Medicinal waters, particularly the acids, are produced by the dissolving and mixing with the minerals they wash away. They are found particularly in places where there is abundance of iron, copper, sulphur, or charcoal. This is the reason there is such difference both in the effect and taste of them, in proportion as they are more or less mixed with either of these substances. They are bitter when they are produced by bitter roots, saltpetre, or copper. They are cold when they come out of rocks, or are impregnated with sal-ammoniac, salt-petre, alum, &c. Oily and bituminous substances make them oleaginous; brimstone mixed with acids makes them sulphureous.

Let us admire the Divine Goodness which has prepared for man those salutary and inexhaustible springs. Mineral waters may certainly answer many other purposes; but it cannot be doubted they were also produced for the preservation of the health of mankind. It is for man that the Lord has made these beneficent waters to spring up. Let us then acknowledge his goodness, and be sensibly touched with it. Those particularly who experience their strengthening and salutary virtue, let their souls, penetrated with joy and gratitude, be lifted up to their Heavenly Father. Let them glorify him, by imitating his example; and let their riches be sources of life and consolation to their fellow-creatures in necessity.

LESSON LXXXIX.

THE BEAUTY AND USE OF MEADOWS AND FIELDS.

THE sight of a large beautiful garden in summer gives us a lively pleasure, which our apartments do not afford, of which we can form no idea. But even the pleasure we feel from the finest garden is not to be compared to that of walking in fields and meadows. The stately tulip, the elegant narcissus, the beautiful hyacinth, none please so much as the simple flowers, which enamel the fertile valley. Whatever charms the flowers may have which are cultivated in our gardens; those in the fields are still more pleasing. There is beauty in the former, but in the latter there is both use and beauty. Mere useless beauty pleases for a moment only. Is it not true, that in those long gravel walks, so even and neat, those arbours and summer-houses, those parterres, those walls, those enclosures; is it not true that we feel confined, and as if oppressed in them? All those places, where the view is confined, seem to set bounds to our liberty. We seem in some degree to be more independent, and more at ease, in proportion as our walk enlarges and lengthens before us. In the country, in summer, nature, fruitful and beautiful, varies every moment its appearance; whereas, in our ornamental gardens, we continually behold the same objects. Even their order and regularity prevent us from being long pleased with them. They have nothing new to offer us, and we tire among them. The eye, on the contrary, wanders with pleasure over objects continually diversified, and extending as far as the sight can reach: it was in order to give us this enjoyment, that in most places the ground was formed smooth and even; but to the end that we might also have pleasing distant prospects, our horizon is surrounded with rising hills. Nature has done still more; it has spared us the trouble of cultivating those flowery meads, or of watering them. An innumerable multitude of seeds are sown in them, which produce a verdure scarce ever interrupted, or which is at least easily renewed. This prodigious variety of plants with which a field is covered, is not for the sight only; they have each a seed, a blossom, qualities, and beauties, peculiar to themselves. It is true, that the same species of herbs is prodigiously multiplied in each field; but perhaps we scarcely make two steps without treading on an hundred different sorts, each of which has its peculiar use. To the pleasure fields afford us, our beneficent Creator has added considerable advantages. They produce plants for our food, and a great number of simples, which serve for medicine. The ox, and the horse, whose services are innumerable, demand no other recompence for their toil, than the free use of the field, or a sufficient quantity of hay. The cow, whose milk is one of the great supports of our life, asks nothing more. The field is the most complete inheritance: its produce is certain, and requires neither sowing nor labour. It only costs the slight trouble of gathering what it yields. We look upon grass with contempt or indifference, perhaps because it grows under our feet, and has not been made the object of our care and culture. But whatever may be the cause of our indifference, we are certainly quite inexcusable. Surely, the sight of our meadows enamelled with flowers, should fill us with admiration of the goodness of the Creator, who, with a bountiful hand pours out abundance for men and animals; his mercy is every where, and there is not a corner of the earth where we may not discover traces of his good providence! Yes, every country, every soil, the sandy and the marshy, the gravelly and the clayey, all equally proclaim the beneficence of the Preserver of the universe.

LESSON XC.

THE TWILIGHT.

IT cannot be doubted that this phenomenon, which we daily behold, is equally with the rest designed for our benefit. The twilight is nothing more than a prolongation of day; which prepares our eyes sometimes to bear the full light, and at other times the darkness of the night. But twilights are not always the same; they vary according to seasons and climates. Towards the poles they last longer than in the torrid zone. The people of that zone behold the sun rise directly above their horizon, and sink down in the same direction under the lower hemisphere; by which means they are left all at once in total darkness. On the contrary, the sun reflecting its rays obliquely towards the poles, and not sinking much below the horizon of the neighbouring people, their nights, though long, are almost all along attended with twilight; therefore not dark. It is a happiness for the former to have scarce any twilight, and for the others to have an almost constant dawn. As for us, who are placed nearly at an equal distance from the torrid and frigid zone, we plainly observe that our twilights become shorter in proportion as the days shorten, and that they increase as the days lengthen. We enjoy day-light an hour or more after the sun has set. The twilight is equally long before the sun rises above the horizon. We owe this useful circumstance to the properties of the air. God hath surrounded the earth with an atmosphere, which rises very high. He formed such proportion between this air and the light which comes upon it, that when it enters directly down into it, nothing can obstruct its course; but when a ray enters sideways, or obliquely, into this air, the ray, instead of passing through the air in a direct line, bends or descends a little lower; so that most of the rays which pierce the atmosphere alongside of the earth, fall again by means of this inflection upon the earth. Instead of following their course in passing by the side, they are bent by the air and directed towards the earth. Thus, when the sun approaches our horizon, many of its rays which pass by us, and are not sent towards us, meet the mass of air which surrounds us, and bending in that mass they reach our eyes; so that we see day-light long before the sun itself appears. This refraction of light in the body of air which surrounds us, is a work equally full of wisdom and goodness for all the people of the earth; but it is a particular blessing to those who inhabit the frigid zones. They would be in darkness for several months together, if they had no twilight. Perhaps this explanation of the origin of twilights may not be intelligible to every reader, but let us leave to philosophers a further detail of it, and limit ourselves to the reflecting on it as reasonable beings.

The honest, though ignorant Christian, may possibly be wiser than many philosophers; who, while they explain and calculate the twilights, lose sight of that great Being who gives to man the light of day.

LESSON XCI. THIRTY-FIRST WEEK.

DIFFERENCE OF ZONES; I. E. GIRDLES OR DIVISIONS OF THE EARTH.

THE Creator having made our earth in the form of a globe, and impressed upon it a double motion, it necessarily followed, that the regions of the earth must be different from each other; not only in respect to the temperature of the air, and the seasons, but to the animals and plants also. In certain countries there is but one season; the summer is continual there, and every day is as hot as our summer days. Those countries are situated in the middle of the globe, and occupy the space called the Torrid Zone. The finest and richest fruits which nature produces, grow there; and it is there in general where she most liberally pours forth her treasures. The day and nights are of equal length most of the year. There are, on the contrary, countries, where during the greatest part of the year it is colder than our severest winters. It is but a few weeks in the year warm enough for the few trees and herbs which are there, to grow or become green; and in those frigid zones, neither the trees nor the earth produce fruit which mankind could feed on. The greatest inequality of day and night is there: each of them last in their turn for whole months together. The two temperate zones placed between the torrid and the frozen, occupy the greatest part of our globe. In those countries, four seasons appear more or less distinctly, according as they approach the torrid, or the frigid zones. The *spring*, wherein the trees and plants bud and blossom, the heat is moderate, and the days and nights nearly equal. The *summer*, during which the fruit of the field and trees ripen, when the heat is more intense, and the days become visibly longer than the nights. The *autumn*, when the fruit and the seeds fall off, and the grass withers, while the night again becomes equal with the day, and the heat is daily abating. The *winter*, during which the vegetation of plants totally or partly ceases, the nights lengthen, and the cold more or less increases.

The countries of the temperate zones are so situated, that in those which are near one of the sides of the torrid zone, the seasons are directly contrary to those of the other temperate zone. When it is summer in one, it is winter in the other, &c. In these parts, nature shows more variety in the produce of the earth, and in animals, than elsewhere.—Wine is peculiar to these countries; for the vine cannot be cultivated, either in intensely hot, or severely cold climates. Mankind in particular have advantages under such climates. However varied the regions of our earth may be, the Creator has provided for the happiness of all who inhabit them. He ordains that each country should produce what is most requisite, according to the nature of the climate. A worm, which feeds on the leaves of the mulberry-tree, spins for the people of the torrid zone a web, from which they take silk for their clothing. A tree, as well as a shrub, bears a kind of husk or shell full of fine cotton wool, with which light clothing is easily made. The cold regions abound with quadrupeds, the skins of which serve for clothing to the inhabitants of the north; and they are furnished with thick forests, which supply them with abundance of fuel. That the blood of the inhabitants of the warm climates, naturally heated, may not be too much inflamed, their fields and orchards give them cooling fruits, in such plenty, that they may send ample provision of them to other countries. In cold climates, the great quantity of fish contained in the sea and lakes, and the number of animals they have, supply the place of fruit. Thus, there is no region in our globe, that does not feel the greatness and goodness of the Almighty. There is no country, however barren and poor we may suppose it, where nature is not bountiful enough to provide, not only the necessaries, but the comforts of life.

LESSON XCII.

SINGULARITIES OF THE SEA.

THE sea is too generally considered only in a terrible light, without reflecting on the wonders and blessings it so visibly presents to us. It is certainly true, that the sea is one of the most dreadful elements; when the tempest roars, its waves swell mountains high, and ships are driven by them on banks of sand or rocks, where they are dashed to pieces. The whirlpools, or those masses of water which make the ships turn rapidly round with their current, and end in sinking or swallowing them up; those whirlpools are occasioned by great cavities in the sea, where rocks and different currents meet. No less dangerous are the water-spouts, which the wind raises from the sea up to the sky. They hover in the air above the ocean, and the wind whirls them round with violence; they often burst with a great noise, and do much mischief to vessels at sea; they frequently break the masts, tear the sails, and sink the ship. But we should be very ungrateful to attend only to the mischief the sea does us, without deigning to reflect on the magnificent works of the Lord, and on his goodness, which shines forth even in the depths of the abyss.

The first thing worthy of remark is the saltness of the sea. It is such, that a pound of water contains two ounces of salt. This salt quality, be the cause of it what it may, was necessary for several purposes: it prevents the water from corrupting, and contributes to make it strong enough to bear the greatest burdens to be conveyed from one place to another. The colour also of the sea-water deserves our observation; it is not the same every where. The different insects, marine plants, the mixture of many things which the rivers wash into the sea, vary its colour here and there. When it is calm, it sometimes appears strewed with brilliant stars. The trace of a ship, which cuts the waves, is often luminous, and seems as a river on fire. These phenomena must be partly attributed to sulphureous particles, oily and inflammable substances in the sea; and partly to shining insects. Every day, or rather in the space of 25 hours, the sea twice rises and falls. When the tide rises, it is called the flood; and when it returns it is the fall or ebb. This phe nomenon is attended with several remarkable circumstances. There is always a flux and reflux at the same time in two parts of the globe, and those are opposite to each other. The tide is always lowest when we are in the first and last quarter of the moon; and our highest tides are generally three days after the new or full moon. However it may proceed from accidental causes, that the tide is sooner and higher one time than another; it is still certain, that great advantages result to us from it, both in purifying the water, and being useful for navigation.—And wonderful as this is, there is much more to interest us. If we consider the contents of the sea, a new world appears; and the number of beings of which it is composed is prodigious. The aquatic animals are not indeed so varied in their species as the terrestrial; but they surpass them in size, and their life is longer than those of the earth or air. The elephant and ostrich are small in comparison of the whale, which is the largest fish the sea contains. Its length is often from 60 to 70 feet. It lives as long as an oak, and consequently no land animal's life can be compared to it. Who could even give a list of the several sorts of animals which live at the bottom, and towards the surface of the sea? Who could tell their number; describe their form, construction, size, and use?

The ocean and seas appear to occupy about two-thirds of our globe. The seas are not only great reservoirs of water, but also, by means of vapours which arise out of them, sources of rain, snow, and other such meteors. How much wisdom there appears in the connexion the seas have with each other, and the continual motion the Creator has impressed upon them!

There are found in the sea, rocks, valleys, caves, plains, springs, rivers, plants, and animals. The islands in the sea are only the tops of a long chain of mountains. And when we consider, that the sea has been less examined than any other part of the globe, we have reason to believe, that it contains still a number of wonders, to which neither the understanding nor the senses of man are adequate; but which all prove the power and wisdom of God. Let us then adore him who has every where, in the ocean, as well as upon earth, fixed monuments of his greatness.

LESSON XCIII.

SEVERAL THINGS REMARKABLE IN ANIMALS.

THE different instincts and properties of animals are a very interesting study. But, to a reflecting being, it is something more than merely an agreeable object. The animal operations teach him to trace them back to a wisdom he cannot fathom, because it surpasses all human conception. This is the effect I wish to produce, by pointing out the singularities observable in certain animals.

The manner in which birds and insects lay their eggs is worth remarking. The grasshopper, the lizard, the tortoise, and crocodile, never trouble themselves about their eggs, nor the young ones that are in them. They lay their eggs in the earth, and leave the heat of the sun

LESSON XCIV. THIRTY-SECOND WEEK.

ON THE GRAVITY OF BODIES.

BODIES are endowed with force, which acts at all times, in all places, and in all senses. If a body endeavours to move towards one point more forcibly than to another, we say that it gravitates towards that point. For experience teaches us, that bodies are inclined to descend; or, that if they are far from the surface of the earth without support, they fall on it in a perpendicular line. It is by no means in the body itself that we must seek the cause of its weight; for a body which falls remains in the state it was put, till some exterior cause changes it. It is equally impossible that the air should occasion this gravity, since being itself heavy, it ought rather to lessen the swiftness of the fall of bodies; we must therefore seek the cause elsewhere. Perhaps the opinion nearest truth, is that which supposes the earth to have the virtue of attracting bodies placed at a certain distance, as the magnet attracts iron: or else, possibly, it may be imputed to a foreign substance distributed throughout all bodies. But though we cannot positively ascertain the cause of weight, nothing is more evident than the advantages which accrue from it. Without it we should not be able to move as we do. When we raise the right foot, we make the left to be the centre of gravity. If we then bend our body forward, we are near falling; but by putting out the right foot, we prevent the fall, and make a step. Thus our walk is, in some respects, a continual course of falls; during which the centre of gravity is preserved between our feet. This is the reason we bend forward in going up a hill, and backward in coming down it. We also lean forward when we carry a load on our shoulders, and backward when we carry it before us. All this is according to the laws of gravity, which govern the motions of animals when they walk, swim, or fly. These same laws govern the motions of the immense bodies which roll in the firmament: the sun attracts the planets; and each planet in its turn attracts its satellites: or, what is just the same, the planets gravitate towards the sun, and the satellites towards the planets; for a body made to turn round always, flies in a direct line from its centre, if it meets with no obstacle in its way. It is with the greatest swiftness that the planets run their course; and the moon is not fastened by a chain to our earth. It seems then, as if a motion so rapid as that of the moon, must throw it very far from us in the immeasurable space, if there was not a force which continually pushes it towards our globe; and which counteracts the force that removes it from hence. That first force is the gravitation of the moon towards the earth. If our earth was either lighter or heavier than it is, what would be the consequence? It would either draw too near or too far from the sun. In the first case, the heat would be insupportable; and in the latter, the cold would be equally so: every thing in our globe would be consumed or frozen. What would then become of the seasons, and many things so indispensable for man, and so necessary for his happiness?

It is not only in the natural world that we see the greatest variety of effects produced by the same cause: in the moral world also, one single disposition of the mind produces no less variety of effects. Let us, for example, consider the natural inclination we have to love one another. From hence is derived the care of parents for their children; social ties; the connexion of friendship; goodness in those who govern, and fidelity in those who obey. Thus, one single propensity keeps each individual in the circle prescribed, and, forming the bond of human society, is the principle of all virtuous actions, of all laudable pursuits, and of all innocent enjoyment.

LESSON XCVI.

VARIETY IN THE STATURE OF MAN.

THE entire height of the human body varies considerably, and the more or the less is of little consequence. The usual height is from five to six feet. Some people, who live in the northern countries along the frozen seas, are less than five feet. The least people of those known to us inhabit the top of the mountains in the island of Madagascar; they are scarcely four feet high. Many of these dwarfish people came originally from nations of a common stature; and the cause of their degeneracy must certainly be imputed to the climate they inhabit. The extreme cold most of the year there; makes both animals and vegetables small; why should it not have the same effect on man? On the other hand, there are whole nations of a gigantic size: the most famous of them are the Patagonians, who live near the streights of Magellan. It is asserted that they are from eight to ten feet high. Neither ought it to appear to us impossible, that there should be people taller than the Europeans. Besides the traces that remain of it in history, and in the monuments of antiquity, there have been seen, even in our climates, men above six feet and a half high; who were, notwithstanding, well proportioned, healthy, and capable of all the exercise and labour which require strength and activity.

Adorable Creator! every thing bears thy stamp: the dwarf as well as the giant; the blade of grass as well as the oak; the worm as well as the elephant.

LESSON XCVII. THIRTY-THIRD WEEK.

THE DOG-DAYS.

THE sun, besides it's diurnal motion, which appears to convey it from east to west, and occasions the revolution of day and night, seems evidently to have another motion from west to east; by this means, at the end of 365 days, it comes again near the same stars from which it had removed for six months, and to which it was drawing near the other six months. On this account, the ancient astronomers divided the seasons according to the stars which the sun meets in its annual course. They divided this course into twelve constellations, which are the twelve signs of the Zodiac;

called the twelve houses of the sun, because it seems to dwell a month in each of them. The summer begins with us when the sun enters the sign of Cancer, which happens the 21st or 22d of June. It is then that the sun is raised at the highest above our horizon, and darts its rays almost directly upon us; and of course at that time begins the heat of summer, which always increases in the following month, by degrees, as our globe is more heated by the rays of the sun. This is the reason that for a month or six weeks after Midsummer, it is generally the hottest part of the year. Now, of all the stars in conjunction with the sun, the dog-star is the brightest; lost in the rays of the sun, it disappears from us for a month, as is the case with every star which the sun meets in its course, and the month of its disappearing is the time called the dog-days. These observations would be of little importance, were it not to remove a rooted prejudice among many people. An ancient tradition attributes the heat usually felt at this time to the influence of the dog-star upon the earth and its inhabitants. This opinion is proved to be absurd, from this circumstance alone, that the concealment of the dog-star in the rays of the sun, does not take place in the time we call dog-days. Those days, properly speaking, do not in reality begin till one month after, and they terminate towards the end of the next month.—When, therefore, in the supposed dog-days, things liable to ferment, turn sour; when stagnated waters dry up as well as the springs; when dogs and other animals are seized with madness; when we are attacked with disorders, which imprudence in hot weather draws upon us; this does not happen because a star conceals itself behind the sun; it is the extreme heat of the air, at that season, which is the cause of all those effects.

Whoever can suppose, that certain figures, which the imagination forms to itself in the sky, can have any influence on our globe, and on the health and reason of man, discovers great want of judgment. It is not the stars, it is generally ourselves, which we ought to accuse of the evils we suffer. Can we suppose an infinitely good being, the Ruler of the world, to have created any thing in the heavens or in the earth, to be a torment and misery to his creatures? If we believe in such as an inevitable fatality, we cannot admit or acknowledge a Creator, the essence of wisdom and goodness. Instead of being guilty of such an error, let us glorify God, and secure our peace, by believing ourselves to be under the protection of a merciful Father, contrary to whose will not even a hair can fall from our heads.

LESSON XCVIII.

CONTEMPLATION OF A MEADOW.

DARK and majestic woods, where the fir-tree raises its stately head, where the tufted oaks spread their shade: ye rivers, which roll your silver waves through the grey mountains; it is not you I now mean to praise; it is the verdure and enamel of the fields which are the objects of my contemplation. How many beauties present themselves to the sight, and how varied are they! Some insects fly from flower to flower, while others creep and crawl in the tufted grass. How soft the murmur of the limpid stream, whose banks are covered with thick grass, intermixed with flowers, which, bending over the water, trace their image in it. Behold that forest of waving herbs! What a mild lustre the sun casts on those different shades of green. Those delicate plants, interwoven with grass, mix their tender foliage; or proudly raise their heads above their companions, and display flowers without perfume; whilst the humble violet grows on barren hills, exhaling its sweets around. Thus one often sees the useful virtuous man in poverty, whilst the rich and great are clothed in sumptuous habits, wasting in idleness the blessings of the earth. Winged insects pursue each other in the grass. Sometimes I lose sight of them in the verdure, and then again I see a swarm of them flying in the air, and sporting in the rays of the sun. What buzzing is this I hear? It is a swarm of young bees. They have lately flown from their distant home, and dispersed over the gardens and fields. They are now gathering sweet nectar from the flowers, in order to carry it to their cells. There is not an idle one amongst them. They fly from flower to flower; and, in seeking their stores, they conceal their velvet heads in the cup of the flower, or else with labour penetrate into those that are not yet unfolded. O how beautiful is nature! The grass and flowers grow luxurious; the trees are covered with foliage; the gentle zephyr salutes us; the flocks seek their pasture; the tender bleating lambs skip and rejoice in their existence; innumerable blades of grass rise up in the field, and to each point hangs a drop of dew. How many primroses with their trembling leaves are here! What harmony in the notes of various birds from yonder hill! Every thing expresses joy. It reigns in the hills and dales, in woods and groves. Happy he whose innocent life passes away in performing his duty to his Maker, and in the enjoyment of the beauties of nature! The whole creation smiles upon him, and joy attends him wherever he goes; his mind is serene as a calm summer-day; his affections are gentle and pure as the perfume of the flowers around him. Happy he who in the beauties of nature traces the Creator, and devotes himself wholly to him!

LESSON XCIX.

VORACIOUS ANIMALS AND INSECTS.

IT is easier to exterminate wolves, lions and other wild beasts, than to extirpate insects, when they swarm over a whole country. At Peru, a sort of ant called *chakoe* is very injurious to the inhabitants; and whose lives would even be in danger, if they did not use precautions to deliver themselves from these dreadful insects. It is well known what caterpillars do to fruit-trees, and mice to the fields. But however real these inconveniences may be; they do not authorise such complaints as we allow ourselves to make; complaints in which self-love has too great a part.—We are pleased at observing that the creatures hurtful to us destroy one another. We think we have a right to take away the lives of animals, either for our food, or for any other purpose; but cannot bear that they should take any thing from us. We expect they should serve for our subsistence, and will give up nothing to them. In reality, however, have we more right over the life of a gnat, that it has to a drop of our blood? Besides, in complaining of the voracity of animals, we do not consider that this plan of nature is not as disadvantageous as it appears. In order to be convinced of this, we have only to consider the animal kingdom in the whole. Such species which appear noxious to us are of real use; and it would be very dangerous to attempt to destroy the race of them. A few years ago, some inhabitants of the English colonies in America endeavoured to extirpate the jays, or jackdaws, because they fancied that these birds did much mischief to the corn; but in proportion as the number of jays diminished, the people were struck with the havock made by an enormous multitude of worms, caterpillars, and particularly the May-bugs. They ceased to persecute the jays; and as soon as those multiplied again, they put an end to the insects which had increased in consequence of their destruction. Some time ago a plan was formed in Sweden to destroy the crows; but they were observed in time, not only to fix on corn and plants, but also that they devoured the worms and caterpillars, which destroy the leaves or roots of vegetables. In North America they pursued the sparrow violently; but it happened from thence, that the gnats increased to such a degree in the marshy countries, that they were obliged to leave a great deal of land uncultivated.

Pheasant-hunting is so considerable in the isle of Percida, that it occasioned the king of Naples to forbid the use of cats to the inhabitants. At the end of a few years the rats and mice increased so much, and did such mischief, that this order was abolished. Then why should we wish to deprive them of the small part of our provisions which they require for food? Could we possibly consume all that nature produces? Shall we want any thing for our support or pleasure, because the birds, the mice, and the insects, help us to make use of the blessings which God grants in such profusion, and part of which would be wasted, were not the animals to feed on it. Instead of giving way to unjust complaints, let us rather in this acknowledge the wisdom of our Creator. Every thing in nature is connected together; and we may be certain that it is for the wisest purposes that they exist.

LESSON C. THIRTY-FOURTH WEEK.

THE BUILDINGS OF THE BEAVERS.

IF a man, who had never heard of the beavers' manner of building, had been shown some of their edifices, he would certainly have supposed them the work of skilful architects. The whole performance of these amphibious creatures is wonderful, and must fill every attentive observer with astonishment. The beavers choose a place to build on where they can have plenty of provisions, and near a rivulet, in order to have a reservoir of water to bathe in.

They begin by making a dike or bank, which keeps the water on a level with the first floor of their house. This bank is about ten or twelve feet thick at bottom. It goes sloping, and insensibly diminishing towards the top, till it becomes no more than two feet. The only materials are wood and clay. The beavers cut through pieces of wood as thick as an arm, with wonderful ease. They fix these into the ground, very close to each other, and interweave smaller and more supple pieces of wood. But as the water would get through, and their watering-place be emptied, they have recourse to clay, with which they fill all the spaces within and without, so that the water cannot run through. In proportion as the water rises, they continue to raise the dike. The bank of the watering-place being finished, they labour at their houses, which are round or oval buildings, divided into three stories, raised one above another: one of them is below the dike, and generally full of water; the other two are above it. They fix these little buildings in a very strong and firm manner on the edge of the watering-place, and always by stories, in order to mount higher, in case the water should rise. If they find a little island near the watering-place, they build their houses upon it, which is then more solid, and they are less incommoded by water, in which they cannot long remain. They make two doors at the bottom to go out into the water. One leads them to their bathing-place: the other is a passage to the place where they carry all the dirt, &c. from their upper apartments. They have a third door higher up, for fear of being taken when the ice stops up the lower doors. They sometimes build their houses entirely on dry ground, and make ditches five or six feet deep, to get to the water. They use the same industry, and the same materials, for the buildings as for the dikes. The walls are perpendicular, and two feet thick. They cut off with their teeth the ends of wood which go beyond the level of the wall, then, mixing clay with dry herbs, they make a composition of it, with which they plaster both inside and outside of the work, by the help of their tail. The inside of the house is arched; and the size is in proportion to the number of inhabitants. With their teeth they cut all the wood they require for building; they make use of their fore-feet to dig the ground, and to soften and mix the clay; their tail supplies the place of a wheel-barrow to carry their mortar or clay, and afterwards serves as a trowel to plaster it on.

The works of the beaver have, then, the greatest resemblance to those of man; of all animals we know, they come the nearest to human reason. We need only observe them, to be convinced that beasts are not mere machines, but that all their actions and motions are directed by a higher principle.

LESSON CI.

ANIMALS CONSIDERED AS EXAMPLES TO MANKIND OF VICES AND VIRTUES.

THE study of animated nature furnishes us with many pleasing ideas; especially as it gives us every where proofs of the Divine Wisdom and Goodness: but I do not know whether we attend as much as we ought to the lessons of morality it seems intended to convey. It is remarkable that compassion belongs to man alone. In God is mercy: in man compassion for all created beings. In the brute creation some few instances of affection are found; no compassion properly so called; no free disinterested pity. Some virtues the brute creatures, especially the domestic animals, may teach us; and doubtless they were intended to do so. The innocent lamb, in a language more powerful than words, instructs us to practise the gentle, meek arts of persuasion. The obedient ox and cow inculcate mild submission. The ass is an example of patience; the generous horse of activity, and aptness to receive instruction. The dog is an example of fidelity and kind attention; the cat of various domestic virtues. Friendship seems unknown, or but faintly expressed amongst animals, excepting dogs and horses: and in them it is chiefly towards man. The vices which the dumb animals teaches us to avoid are much greater, and more in number, than their virtues. The gluttony and sloth of the hog we detest. The pride and ill-nature of the peacock we dislike as much as his voice. The turkey is a pattern of all the vices in man; and is an exception, as well as the hog, to the moral character of the domestic beasts and birds.

Though what is here mentioned may be styled common place, yet so long as mankind are inattentive, such things may properly be pointed out, and much more might be said. The beaver, if contrasted with the glutton, the bee with the wasp, the ant with the flesh-fly, would teach us, as well as the domestic animals, to do good, and avoid evil. But the subject is almost inexhaustible. I will therefore conclude with a part of the creation more numerous, perhaps, than all the rest put together; I mean the fish, both those with scales, and those which have shells: they seem to travel in vast bodies, not from any love of society, but merely because they are born in the same or in neighbouring situations, and live on the same food, which they find near the coasts where they themselves are to feed us.

LESSON CII.

SENSITIVE PLANTS.

WE observe certain motions in plants, which make it doubtful whether they have sensibility or not. There are vegetables, the flowers and leaves of which contract and shrink from the touch. We see others, which open and close their flowers at certain fixed hours of the day, so regularly as to mark the time very exactly. Others take a singular form in the night, and fold themselves up. These motions in the plants are the same, whether they are in the open air, or in a close room. Those which always live under water, raise their heads above it in the time of feeding. The movements of a marshy plant discovered lately in Carolina are still more singular: the upper side and edge of its round leaves are covered with a number of notches, which are extremely irritable; when an insect chances to creep on this upper side, the leaf folds it up close, and presses it to death, and then opens itself again;

We may every day observe certain regular motions in some of the plants in our gardens. The tulips blow in fine weather, but they close again when it rains, or at sun-set; peas and beans, open their husks when they grow dry, and roll up like chips. Wild oats, when put on a table, often move of themselves, particularly if they have been made warm in the hand. Do we not also observe that the flowers of several plants are always turned towards the sun? These are undeniable facts, which any body may easily experience. From thence it was wished to draw a conclusion, that there was some sensibility in plants; and it is true, that the above-mentioned facts give a degree of probability to that opinion. But, on the contrary, there has not been any other mark of sensibility discovered in plants; every thing appears absolutely mechanical in them. We plant a shrub, and destroy it, without observing any analogy between the animal and it. We observe a plant shoot, grow, blossom, and turn to seed, as we observe the hand of a watch run over all the points of the dial. The most exact anatomy of a plant does not discover any organ the least resembling the seat of animal sensibilty. When we oppose these observations to those from whence the sensibility of plants may be inferred, we remain in doubt, and know not how to explain the above-mentioned phenomena. Perhaps, all we observe in regard to the motions of plants may only proceed from the construction of some of their fibres, which sometimes contract, and sometimes expand. Perhaps the subtile exhalations of our bodies cause the sensitive plants to shrink when we touch them. But it may also possibly be, that all nature being linked, the first degree of sensation may subsist in certain plants; as indeed the step is very narrow between the plant and the muscle shell-fish. Therefore, sensibility may perhaps extend even to plants, at least to those nearest to the animal.

Behold, how very imperfect our knowledge is on these subjects! A great deal is mere conjecture: yet we know enough to satisfy a reasonable curiosity. Let us endeavour to apply the knowledge we have, without losing time in speculations more curious than useful; and without aiming at understanding what may perhaps be reserved for those who come after us, or even to eternity itself.

LESSON CIII. THIRTY-FIFTH WEEK.

VARIETY OF PLANTS.

ONE of the things most worthy our admiration in the vegetable kingdom, is the great variety of plants. They are varied in respect to their parts, their production, their properties, and qualities. The manner in which some plants become fruitful is still very obscure. It is but little known, how it operates in mosses, mushrooms, and ferns. There are plants which show us singular monstrosities; there are flowers which have no heads; there are some, from the middle of which spring out other flowers. Certain plants, called soporiferous, which turn at night differently from what they do in the day. Others turn towards the sun; others shrink and contract when we touch them. There are flowers which open and shut at certain regular hours. Some shoot up, blossom, bear fruit, and drop their leaves, sooner than others. All plants are originally wild; that is, they grow without culture. The Creator assigned for plants a climate adapted to their nature and purposes, and where they should arrive at the greatest perfection. But those which are exotic may be naturalized with us, and made to succeed very well, provided care be taken to procure for them the degree of heat their nature requires.

What particularly charms the eye is the variety of forms and colours in plants. Let even the different sorts of the same species be compared, and we cannot but admire the astonishing variety of models in the vegetable world. We step with wonder from the truffle to the sensitive plant, from the mushroom to the carnation, from the acorn to the lilac, from the *nostoch* to the rose-tree, from moss to the cherry-tree, from the morel to the oak, from the misletoe to the orange-tree, from the ivy to the fir. If we consider the numerous sorts of mushrooms, or the kind of plants which we call imperfect, we cannot but admire the fertility of nature in the production of those vegetables, which are so different in form from the others, that we can scarce rank them among plants. If we afterwards rise some steps above the chain of plants, we behold with pleasure the degrees of those with stalks, from the grass which grows between the stones, to that inestimable plant to which we owe our principal food. We, in the next place, observe the variety of creeping plants, from the tender bind-weed to the vine. We cannot too much admire the perfect harmony, as well as the variety of the works of nature.

Every plant, from the hyssop, which grows on walls, to the cedar of Lebanon, have the same essential parts. A little herb is as complete a plant as the most beautiful rose, and the rose is not less so than the finest oak. Though each species is distinct from the other, all belong to the same source; all observe the same general laws of growth. Let us acknowledge the greatness of that power who produced and supports so great a variety in the vegetable kingdom.

LESSON CIV.

DIVISION OF THE EARTH.

ALL the known countries of the earth are divided into four principal parts, Europe, Asia, Africa, and America.—Europe is the smallest. The Europeans, however, possess some countries in the three other parts of the world, and have subdued near one half of the earth. They travel into the four quarters of the globe, and trade with all the different countries; nor do we know of people so well informed, or who cultivate the arts and sciences with more success.

Europe is the only part of the earth which is every where cultivated, and covered with towns and villages; the only place where the inhabitants keep up a constant intercourse, and profess nearly the same religion. The three other parts are inhabited by a multitude of different nations, which have no connexion with one another; who are scarcely acquainted; and who differ greatly in their manners, way of living, and in their religion.

Asia is the largest known continent: as the countries that are in the interior of this part of the world do not enjoy the cool sea breezes, as they are not watered by many rivers, as they have vast plains and barren mountains, the heat and cold are in the extreme. Some parts of Asia are inhabited by people, who in the morning pull down their towns and villages (being composed of tents) to carry them some miles further, and build them up again at night in an hour. It seems as if nature had made this wandering and unsettled life necessary; and intended, that the establishment, laws, and government of these people should be less durable, and more subject to change, than elsewhere. The other people of Asia often suffer greatly from the restless and unquiet character of these wandering nations. The northern parts, which are full of lakes, marshes, and forests, have never been regularly inhabited; but the southern, eastern, and western countries are the finest in the world, and are wonderfully fertile, producing the necessaries of life in great abundance.

Next to Asia, Africa is the largest part of our hemisphere, computed to be a thousand leagues square. As it is under the torrid zone, there are immense sandy desarts, mountains of prodigious height, forests inhabited by monsters of various sorts. The oppressive heat enervates and weakens every faculty of Europeans, to whom the innermost parts of Africa are still unknown.

America was not discovered by the Europeans till within some centuries. It is divided into two continents, separated only by a very narrow isthmus, or neck of land, and surrounded by a great many islands. The cold climate of the northern part, its few productions, and its distance from inhabited countries, prevent its being entirely known as yet; but we have every reason to believe, that the natives are uncivilized. The earth there is still covered with forests and marshes; and hitherto the Europeans have only cultivated the eastern coasts. In the south of America there were formerly some great nations. The remainder was inhabited by savages. It is, as well as in the East Indies, the country for serpents, reptiles, and insects, which are much larger than in Europe. It may be said, on the whole, that America is the country of greatest extent, but with the fewest inhabitants.

If we reckon the number of leagues these four parts of the globe occupy, their size will appear very considerable; and yet all the known countries make but a fourth part of this earth. And as we know but little of the worlds above us, let us at least endeavour to know that which we inhabit, and to turn that knowledge to the glory of the Almighty.

LESSON CV.

MORAL REFLECTIONS ON SEEING A FIELD OF CORN.

THIS field was lately exposed to great danger: impetuous winds whistled round it, and the storms often threatened to beat down and destroy the wheat. However, Providence has preserved it hitherto. It is thus that the storms of affliction often threaten to overwhelm us. But this very tempest is necessary: it purifies and roots out the tares of vice. In the midst of trouble and sorrow, our knowledge, faith, and humility, increase and strengthen. It is true, that, like the weak ear of corn, we sometimes bend and are bowed down to the ground; but the merciful hand of our Father supports and raises us up again. Towards harvest time, the corn ripens fast. The dew, the heat of the sun, and the rain, all combine to hasten it. Oh! that we may, from day to day, grow ripe for heaven. May all the events of our lives lead to that salutary end. Whatever be our situation here; whether the sun shines upon us, or is wrapt up in clouds: whether our days be gloomy or serene: no matter, provided all concur to increase our piety, and dispose us better for eternity. It is very remarkable, that the ears of corn loaded with grain differ considerably in height from those that are poor and thin. The latter are upright, rise high, and overlook the whole field; whereas the others bend under their own weight. Behold the emblem of two sorts of men! The vain and presumptuous, who do but little, set themselves above others, and look with contempt on the truly humble. A foolish presumption blinds them, and makes them despise the means of salvation. Those, on the contrary, who are rich in virtue and good works, humbly bend down like the well-filled ears of corn.

' How many tares and weeds are mixed with the corn! Such is the situation of a Christian in this world. There is always a mixture in him of good and bad qualities, and his corrupted nature, like the tares, often interrupts the progress of virtue. A field of corn is not only the image of one individual, but also of the church in general. The profane and the wicked often, by their bad example, sow tares in a field where there ought to be none but good seed. The great Lord of the field permits the tares to remain some time. He tries patience and forbearance; and it will not be till the time of harvest, in the great day of retribution, that he will give free course to his justice.

Behold with what eagerness the country people run to gather the fruits of the earth! The scythe cuts all before them. Thus death sweeps all away, the high and the low, the saint and the sinner. Then let us hope we shall meet in the blessed society of angels! That we shall gratefully recollect our past labour and pain, the dangers and storms we had experienced, and that we may be able to raise our voices with one accord to bless the beneficent Father who watched over us. May this sweet hope support us in the time of trouble. Let it comfort us in our sorrow, and make us wait with patience for the day of harvest.

LESSON CVI. THIRTY-SIXTH WEEK.

THE BEAUTY AND VARIETY OF THE BUTTERFLIES.

LET us reflect on these little creatures before they are gone. Perhaps our observations will interest both the heart and the mind.

Of some the dress is plain and simple; others have a few ornaments on their wings; but some have a profusion, and are all over covered with them. How beautiful the shades variegate! With what delicacy has nature penciled them! But, however great our admiration in seeing this insect with the naked eye, how much it increases when examined through a microscope? Would any one ever have imagined, that the wings of butterflies were covered with feathers; and yet nothing is more certain. What is commonly called dust, is found in reality to be feathers. There is as much symmetry in their construction and form, as there is beauty in their colours. The parts which make the centre of these little feathers, and are next to the wing, are the strongest. Those, on the contrary, which form the exterior circumference, are much more delicate, and wonderfully fine. All these feathers have quills at bottom; but the upper part of them is more transparent than the quills. If the wing is touched roughly, the most delicate part of the feathers is destroyed by it; but if all that we call dust should be rubbed off, there would only remain a fine transparent skin, in which we might distinguish the little cells or hollows, wherein were stuck the quill of each feather. This skin, from the manner in which it is composed, may be distinguished from the rest of the wing, nearly as we distinguish a fine lace from the linen on which it is sewed; it is more porous, more delicate, and edged with a fringe, regular, and exquisitely fine. What are our most elegant dresses, in comparison with that which nature has given to this insect? How very delicate does a fine cambric appear to us! How fine the threads, how regular the weaving; and yet, through the microscope, they appear like packthread; and we should rather suppose they were interwoven by a basket-maker, than produced from the loom of a good weaver: yet this beautiful insect proceeds from a mean-looking worm. How much it has changed, since, in the form of a reptile, it crawled in the dust, and was frequently in danger of being crushed! In this extraordinary insect, we may see the emblem of the transformation which awaits us. A day will come, when, quitting our present form, we shall cease to crawl upon the earth. Being made perfect, and having nothing to set bounds to our flight, we may then soar beyond the stars themselves.

LESSON CVII.

THE FORMICA LEO, OR LION ANT.

NO insect is more famous for its dexterity than the *formica leo*, although its appearance promises nothing extraordinary. It is something like the wood-louse. It has six feet, and its body (which is composed of several membraneous rings) terminates in a point. Its flat square head is armed with two moving hooped horns, the singular construction of which shows how admirable nature is, even in its smallest works. This insect is the most cunning and dangerous enemy the ant has. The plans he forms to catch his prey are most ingenious. He undermines a piece of ground, in the shape of a funnel, in order to stay at the bottom of it, and draw down any ants which may chance to come to the brink of this precipice. The method of digging it is, first to trace a circular ridge in the sand, exactly the size of the funnel, the diameter of which is always equal to the depth he chooses to make it. When he has fixed on the size of this opening, and traced the first ridge, he immediately digs a second, concentric to the other, in order to throw out all the sand enclosed in the first circle. He performs all this with his head, which is like a shovel: the flat and square shape makes it fit for the purpose. He also takes up sand with one of his fore-feet, and throws it over the first ridge; and this he repeats till he has got to a certain depth in the sand. Sometimes in digging he meets grains of sand rather large, or little particles of dry earth, which he cannot bear in his funnel, and gets rid of it by a quick well-measured motion of his head. If he finds still larger pieces, he endeavours to put them away with his back; and he is so earnest in this labour, that he repeats it six or seven times. His traps once laid, he is on his watch. Quite still and concealed at the bottom of the hole which he has dug, he there waits for the prey which he could not pursue. If an ant come to the brink of the precipice, it seldom fails of falling to the bottom, because the edge goes sloping, and the loose sand which gives way under his feet, draws down the insect into the power of his enemy, who drags him by the help of his horns under the sand, and feasts upon him. When there remains nothing but the dry carcase, he throws it out of the hole; and if the bank is hurt at the top, he puts it in order again, and lies in ambush as before. He does not always succeed in catching his prey the moment it falls—for it often escapes, and endeavours to run up again to the top; but the formica leo works with his head, and throws up a shower of sand higher than the ant, which drives it down again into the hole. All the actions of this little animal contain such wonderful art, that we can scarce tire of examining him. He prepares the hole even before he sees the insect distined to become his food, and yet his actions are so regulated, that they prove the surest means of providing for his subsistence. According to the make of his body, he is obliged to work backwards, and to make use of his horns as tongs to throw up the sand to the edge of the funnel.

The instinct which directs this insect, discovers to us a First Cause, whose foresight knew and ordained all that was necessary for the preservation and welfare of this animal. The dexterity it shows is not the effect of experience or practice: it is born with it. We must therefore seek its source in that Great Being who proportions the instinct of animals to the degrees they require.

LESSON CVIII.

THE NATURE AND PROPERTIES OF SOUND.

ALL sounds are produced by means of the air; but it is necessary for that purpose that the air should be in motion. It is not that every movement of the air occasions a sound; for if this were the case, all wind must be attended by a noise.. In order to form a sound, the air must be suddenly compressed; and must dilate and extend again by its elastic power. This occasions a kind of trembling undulation, something like that of the waves and circles occasioned by throwing a stone into the water. But if this undulating motion was only to be effected by the particles of air being compressed, the sound would never reach our ears. It is necessary that the sonorous bodies, after making impression on the contiguous air, should continue that impression from particle to particle all about us. By this means the particles of air reach our ear, and we have a perception of sound. This progress is made with great swiftness. Sound goes a thousand feet in a second of time, and consequently a German league in twenty seconds. It is very remarkable that a weak sound propagates as quick as a loud one. The motion of the air, however, is stronger when the sound is stronger, because a greater mass of air is put in motion. A thin elastic membrane, stretched at the bottom of the ear like a drum, receives the vibrations of the air; and by that means we have the power of distinguishing sounds. If there were no sounds, all mankind would be dumb, and we should be as ignorant as a child before it can speak; but by means of sounds every creature can express its wants and its enjoyments. But if we enquire, how it is that, when we pronounce a word, it creates in us the idea of a word, and not a mere sound, or how a tone can act upon our souls, and produce so many different sensations, we are obliged to acknowledge our ignorance. It is enough for us to be convinced by this, as by every thing else, of the wisdom and goodness of our Creator.

LESSON CIX. THIRTY-SEVENTH WEEK.

THE MYSTERIES OF NATURE.

WHEN men attempt to penetrate into the causes of the effects daily under their observation, they are obliged to acknowledge how limited their understandings are. There are a great number of effects in nature concealed from us; and those which we are able to explain have still some obscurity in them, which reminds us that we are but men. We hear the wind whistle; we experience its great and different effects; but we know not exactly what produces it, what increases its violence, or what abates it. From a little grain we behold grass and ears of corn spring up; but we are ignorant how it is done. We still less comprehend, how from a little fruit-stone there can grow a plant, and then a great tree, under whose shade the birds make their nests; which tree is covered with leaves and blossoms, to shade us, and afford us fruit to eat, and wood for our use and convenience. We behold the wonderful effects of the loadstone, and we believe there must be a certain matter which operates in it; but whether it acts by an attractive force peculiar to itself, or whether it circulates continually round the loadstone, and forms a sort of vortex, is what we cannot decide. We feel the cold, but no man has yet discovered what occasions it. Nature at every step presents us wonders which confound us; and whatever researches, or discoveries, we have made, there still remain many things we cannot comprehend. It is true, we sometimes are able to give happy explanations of certain phenomena; but the principles, the first springs, their nature and manner of operating, are certainly above the sphere of our understanding.

The mysteries of nature afford us daily lessons of wisdom, in regard to the mysteries of religion. In nature, God has placed within our reach the means of passing our temporal lives happily, although he has concealed the causes from our sight. Thus, in the kingdom of grace, he furnishes us with means of arriving at a spiritual and everlasting life, though the manner in which they operate remains concealed from us. Would any one refuse to eat and drink, till he knew how it is that food gives him strength, and preserves his life? Or would he neither sow nor plant for want of having a just idea of the manner in which vegetation operates? If we find things which we cannot comprehend, or thoroughly know, let us receive them with humility, and acknowledge the weakness of our understanding. The advantages that they are of to us, when we make a good use of them, convince us that they are the work of a Being infinitely wise and beneficent; and this is sufficient for us to know.

LESSON CX.

FISH.

WHO that had never seen fish would have believed there were such creatures? If a naturalist only knew animals that walk and breathe on land, as the rein-deer does, and was told that there were creatures in the water, so formed as to live, move, multiply, and to fulfil every animal function in that element with ease and pleasure, would he not treat it as a fiction; and conclude, from the effect on our bodies, when plunged into water, that it is absolutely impossible to live in that situation. It is certain, that the way in which fish live, their construction, motion, &c. are quite wonderful, and afford fresh proofs of the omnipotence and infinite wisdom of our Sovereign Creator. To enable these creatures to live in water, it was necessary to form their bodies in many essential points, very differently from those of land-animals; and we find this to be the case in fishes, both within and without. Thus the all-wise Creator has given to most fish a slender thin body, flattened at the sides, and always a little pointed at the head, that they should swim, and cut their way better in the water; and they are covered with scales of a horny substance, to preserve their bodies from being hurt by the pressure of the water. Those without scales are enveloped with a fat and oily substance, to preserve them from putefraction, and to guard them from the cold. Their bones are different from other bones, to make their bodies more flexible. Their eyes are sunk into the head, to guard them from being hurt. It is evident, that in the formation of all those parts, the Creator has considered the way of life and destination of these animals. But there are still more wonderful circumstances in their construction. The fins are almost their only limbs, and yet are sufficient to perform all their motions. By means of the tail-fins, they move forward; the back fin directs the motion of the body; they raise themselves up by the breast-fin, and that of the stomach serves to balance them. The gills are their organs of respiration. These are behind their head. There are four on each side, the uppermost of which are the largest. They are continually swallowing water through their mouths, which is their drawing in of breath, and they cast it through their gills, which is their way of breathing out again. The blood which comes from the heart, and flows into the veins of the gills, does not return back to the heart through the lungs, as in land animals, but it is directly dispersed throughout all parts of the body. One of the organs most necessary to fish in swimming, is the bladder of air in their stomach. By means of this bladder they make their body more or less heavy. When this vein swells and extends, they become lighter, can raise themselves, and swim to the surface of the water. When it contracts, and the air is thereby compressed, the body becomes heavier than the water, and consequently sinks down.

The prodigious quantity of fish, with the great variety of shape and size, is worthy admiration. In Germany alone there are above four hundred species of fish; and who can count the numbers there are of each species? The very largest, as well as the smallest of animals, are to be found amongst fish. We ought to admire the power and wisdom of the Creator in the forming and preserving of these animals, and his goodness in giving them for our use.

LESSON CXI.

INFLUENCE OF THE MOON ON THE HUMAN BODY.

FORMERLY there were imputed to the moon certain influences upon the body, which were only calculated to raise superstition and groundless fears. The gardener would not plant till he had consulted the moon. The ploughman deferred sowing till he was certain of its happy influence. Sick people attended, with superstitious exactness, to the changes of the moon; and the physicians themselves observed it in their prescriptions. By degrees these prejudices have been removed; and it is our duty to make it still more universal, and to endeavour to banish, as much as we can, the superstitions of old times. In regard to the influence of the moon on our bodies, the safest way is to preserve a medium: for as it would be irrational to attribute to that planet too great a power over the human body, so it would be no less rash to deny it any effect. It must in reality be allowed, that the moon occasions great changes in the air, and of course may produce some in our bodies. The moon causes such considerable alteration and motion in the higher atmosphere, that earthquakes, winds, heat, cold, vapours, and fogs, result from thence; and in that case, the health of our body will, in some measure, depend on the influence of the moon. The power this planet has over the human body is founded on an undeniable principle, which is, that our health greatly depends on the weather, and the sort of air we breathe; and it is certain that the moon causes many alterations in the atmosphere. Perhaps there may be even a flux and a reflux in the human body occasioned by the moon, like that in the air and sea.

In general, it is a principle we ought to admit, to the glory of our Creator, that throughout all natural things there are certain connections, which influence in different ways the animal economy. There are, without doubt, many wonders in the atmosphere, still remaining unknown to us, which cause many considerable revolutions in nature. Who knows if some of the phenomena of the natural world, which we do not think of, or which we attribute to other causes, may not depend on the moon? Perhaps the light it affords us in the night is one of the least of the purposes for which the Almighty formed this planet. Perhaps its being so near our earth was to produce certain effects on us, which the other celestial bodies, from their distance, could not do. It is at least certain, that every thing in the universe has relation more or less to our globe: and this is what renders the world a master-piece of the Divine Wisdom.

LESSON CXII. THIRTY-EIGHTH WEEK.

THE IGNUS-FATUUS.

THE Ignis Fatuus are little light flames, which play in the air, only a few feet from the ground, and appear to go here and there, and every where. These fires seem sometimes to disappear and go out all at once, probably when bushes or trees conceal their light, but they kindle again immediately in other places. They are not common in cold countries; and it is said that in winter they chiefly appear in marshy places. In Spain, Italy, and other hot countries, they are known at all seasons, and neither rain nor wind extinguishes them. They are frequently seen where there are putrid plants, or animal matter, as in church-yards, shores, and in marshy grounds. There have been too few experiments made on these sorts of ethereal fires, to determine precisely as to the nature of them. But the places where they are generally seen may give rise to probable conjectures; for as they scarcely ever appear but in marshy countries, it is natural to suppose them sulphureous vapours which take fire. It is known, that carcases and rotten plants sometimes cast out light. Perhaps vapours condensed by the cold of the night take the appearance of the Ignis Fatuus. Perhaps it may be the effect of a slight electricity produced by the interior motion of the vapours which rise in the air. Horses, dogs, cats, and even men, may become so electrical as to cast out sparks of fire, when they are rubbed, or otherwise put in motion. May not this be the case with some parts of the earth? It may so happen, that, in some circumstances, a field shall be electrified in some parts of it, and then it is not surprising that it should appear luminous.—Even the air may occasion the Ignis Fatuus, when it is electrified to a certain degree. If the manner of their being produced is still doubtful, we are certain, at least, that they proceed from natural causes, and consequently are not obliged to have recourse to superstition. What may have given rise to this superstitious idea, is the observing that the Ignis Fatuus follows all the ways of the wind, and thus flies from those who pursue it; and, on the contrary, follows those who try to avoid it, and fixes on carriages which go swiftly. But the reason of this phenomenon is very evident: for the person who pursues this flame drives the air, and consequently the fire, before him: whereas the person who flies leaves an empty space, which the ambient air fills up continually. This produces a current of air between him and the fire, and of course draws it after him. This is the reason we observe it stop when the person ceases to run. We might spare ourselves many fears, if we would take the trouble to examine the objects which frighten us, and seek for their natural causes.

LESSON CXIII.

OF MINERALS.

IN order to provide mankind wholesome and convenient dwellings, they require many materials. If these materials had been spread over the surface of the earth, it would have been entirely covered with them, and there would not have been room for the animals and plants. Our earth is happily free from such incumbrance. The ground is left free to be cultivated and enjoyed by its inhabitants.

Minerals may properly be divided into four classes of very distinct characters. The first includes *fossils*. We give that name to minerals, which cannot be dissolved either in water or oil, and are not malleable, and which bear the fire without losing any substance in it. To this class belong not only the simple earths, but the stones also which are composed of them. There are two sorts of stones, the precious and the common stones. The latter are very numerous, and present us masses different in form, size, colour, and hardness, according to the earth, sulphur, &c. of which they are composed. Precious stones also differ very much. Some are perfectly transparent, and appear to be most simple. Others are more or less opaque, according as they are composed more or less of heterogeneous particles. The *salts* form the second class of minerals. It comprehends bodies which water dissolves, and which produce a relish. They are divided into acids, which are sharp and sour; and into alkalies, which leave an acrid, burnt, lixivius taste on the tongue. These have the property of changing into green the blue juice or dies of vegetables. From the just and exact mixture of these two different salts, tempered by each other, proceeds the neutral or middling salts: such as the common kitchen salt, which is either taken out of the earth, or prepared with sea-water, or obtained by the evaporation of salt-water boiled in great caldrons. All these salts together are one of the chief causes of the vegetation of plants. They possibly serve also to unite and fix them, as well as all the other compound bodies, and they occasion fermentation, the effects of which are so numerous and different. The third class of minerals comprehend inflammable bodies, to which are given the name of *bitumens*. They melt in the fire; and when they are pure, they dissolve in oil, but never in water. They are distinguished from other minerals by the inflammable substance they contain more of than any other; and which renders combustible the bodies they mix with, if in sufficient quantity. The fourth class of minerals is the *metals*. They are much heavier than the rest, and become fluid in the fire, but resume their solid state when cold. They are bright, and are capable of being distended under the hammer. There are some metals, which, though melted in the fire, do not diminish in weight, or undergo any other sensible alteration. This gives them the name of *perfect metals*. There are two of this order, viz. gold and silver. The metals called *imperfect* are reduced more or less quickly by fire, and generally change into a calx. One of these (lead) has the property of changing into glass, and of vitrifying also all the other metals, except gold and silver. There are five of the imperfect metals, quicksilver, lead, copper, iron, and tin. Lastly, there are bodies which differ from these metals by not being malleable. They are called half-metals, and there are seven of them; the platen, bismuth, nickel, arsenic, antimony, zink, and cobalt.

The mineral kingdom is the great warehouse of nature, where she secretly labours for the good of the world. No naturalist can surprise her in her operations, and steal from her the art with which she prepares, collects, and composes earths or fossils, salts, bitumens, and metals. Happily, in the use we make of nature's gifts, it is of little consequence that we should know their origin and first principles. It is enough that we should understand their use: we need no more, to prove the glory of the Creator;

as we are convinced that there is not a spot, either above or below the earth, in which he has not shown his power, wisdom, and goodness.

LESSON CXIV.

SOME OF THE CHIEF EXOTIC PLANTS.

WE do not pay attention enough to the gifts of God, particularly to those which come to us from distant countries, and are now so necessary to us. If we considered how much trouble its costs, and how many wheels in the machine of the world must be put in motion, and how much human industry it requires to procure us a single lump of sugar or blade of cinnamon, we should not receive the presents of nature so coldly as we generally do; but on the contrary, we should look up with the warmest gratitude towards that beneficent Being, who makes use of so many means of bestowing blessings upon us. Sugar, is the salt found in the juice or marrow of a certain reed, which is cultivated chiefly in Brasil and the neighbouring islands; but which also grows in great abundance in the East-Indies, and some of the African islands. The preparation of sugar does not require much art, but is extremely laborious; and it is generally the employment of slaves. When the canes are ripe, they cut and carry them to the mill, to bruise and extract the juice from them. They first boil this juice, which would otherwise ferment and grow sour; and while it is boiling, they skim it to take off any dirt. They repeat this course four times in different caldrons. To purify and clarify it the more, they throw into it a strong ley of wood ashes and burning lime, and at last pour it into the moulds where it coagulates and dries.

Tea is the leaf of a shrub, which grows in Japan, China, and other Asiatic provinces. Three or four times during spring, these leaves are gathered. Those of the first crop are the finest flavoured, and the most delicate. This is called the imperial tea, and but seldom if ever comes into Europe. That which the Dutch sell under its name is tea of the second crop. Coffee is the stone of a fruit like a cherry. The tree which produces it is originally from Arabia; but it has been transplanted into several hot countries. Next to Arabia, it is best cultivated in the isle of Martinico. We call the stone in the middle of the fruit the berry. This berry, when fresh, is yellowish, or grey, or a pale green; and it preserves this colour in some degree when dry. They spread the fruit on mats to dry in the sun; and afterwards bruise it with rollers to force out the berries. This is what divides the berry in two. They again dry them in the sun before they put them on shipboard. The cloves are buds, or dried blossoms of a tree, which formerly grew without culture in the Molucca islands, but which the Dutch have transplanted to Amboyna. This tree is of the size and shape of the bay-tree: its trunk is covered with bark, like that of the olive. White blossoms grow in tufts on the extremities of the branches, and look like cloves. The buds are at first of a pale green, afterwards they become yellow, then red, and at last a dark brown, such as we see them. They have a stronger and more aromatic smell than the mother clove, a name which marks the dry fruit of the tree. Cinnamon is the second bark of a kind of bay-tree, which scarcely grows any where at present but in the island of Ceylon. The root of the cinnamon-tree divides into several branches. It is covered with a bark, grey without, and red within. The leaf would much resemble the laurel, if it was shorter and less pointed. The blossoms are small and white, of a very pleasing smell, very much like the lily of the valley. When the tree is some years old, the two barks are taken off; the outer bark is good for nothing, and thrown away; the inner one is dried in the sun, where it rolls up of itself; and this is what we call cinnamon. The nutmeg and mace come from the same tree, and grow in the Molucca islands. The nut is covered with three coats. The first falls off of itself when it is ripe; the second then appears, which is very thin and delicate. It is taken off with great care from the nut, and exposed to the sun to dry. This is called mace in the Molucca isles: though in other places improperly called nutmeg-blossom. The third coat is immediately next the nutmeg. They take the nut out of its shell, and put it into lime-water for some days, and then it is properly prepared to send abroad. Cotton grows in most of the countries of Asia, Africa, and America. It is enclosed in the fruit of a certain shrub. This fruit is a sort of pod, which when ripe opens a little, and shows a wad or flock of down, extremely white, which we call cotton. When this pod is swelled by the heat, it becomes as large as an apple. With a little mill they separate the seed from the cotton. The seed falls out on one side, and the cotton on the other. They afterwards spin it for all sorts of work. Olive-oil is the juice squeezed out of that fruit, which grows so abundantly in France, Spain, Portugal, and Italy, that there are whole forests of olive-trees. The inhabitants of the provinces where there are many of these trees, make use of this oil instead of butter, as the extreme heat dries up the grass so that they have not much cattle. Pepper is the fruit of a shrub, the stalk of which requires a prop to support it. Its wood is knotty like the vine, which it much resembles. Its leaves, which have a very strong smell, are of an oval form, and terminate in a point. In the middle, and at the ends of the branches, there are white blssoms, from whence spring fruit in clusters, like the gooseberry. Each cluster bears twenty or thirty seeds.

Behold how every country contributes to furnish us with the necessaries and conveniences of life. Then how can we forget God, who every where provides for us, and signalizes his goodness towards us over the whole earth?

LESSON CXV. THIRTY-NINTH WEEK.

THE VINE.

WE need only reflect on the vine, to be convinced how unreasonable those are who complain of the inequalities and unevenness of the ground. The vine never flourishes on a flat, neither does every sort of hill agree with it, but those only which are turned towards the east or south. Hills are in a manner the bulwarks of nature, which she invites us to cultivate as so many vast walls for fruit, where the warm reflection of the sun unites with the fine open air to nourish them. Even the most barren hills, and those hanging grounds, where the plough cannot be used, are every year covered with the most beautiful verdure, and produce the most delicious of all fruit. If the soil where the vine grows appears so poor and bad, the plant which furnishes us with wine is little better. Who would have thought that it could produce so valuable a liquor? And yet such is the fire with which the vine is animated, that the sap flows through it with five, or even eight times more force, than the blood in the veins of animals.

Asia is originally the country of the vine. From thence its cultivation has gradually extended into Europe. The Phenicians, who travelled in early days over all the Mediterranean coasts, conveyed it to several islands, and to the continent. It succeeded wonderfully in the islands of the Archipelago, and was afterwards carried into Italy. The vines multiplied greatly there; and the Gauls having tasted the juice, and wishing to settle in the places where the vines grew, passed the Alps, and went to conquer both the borders of the Po. By degrees vines were cultivated all over France, and at last on the borders of the Rhine, the Moselle, Necker, and other Provinces of Germany.

These observations may give rise to many important reflections. As the most barren soil is fit for the culture of vines, so it often happens that the poorest countries are favourable to-science and wisdom. We have known, in provinces universally despised for their poverty, geniuses rise up, who have by their knowledge enlightened other kingdoms.

The vine, with its dry and shapeless wood, is an emblem of those, who, devoid of the outward splendour of birth and honours, fail not to be very useful. How often does it happen, that men who live in obscurity, and whose appearance promises nothing, are, however, capable of actions, and perform enterprises, which raise them equal to the esteemed and great people on earth.

Let us here reflect on Christ himself. To judge of him by the low condition in which he appeared, who could have expected from him such great works, so wonderful, and so salutary to mankind? He who, like the vine, was planted in a barren soil, has borne fruit which is a blessing and salvation to the whole earth. He has also proved to us, that one who is poor, despised, and miserable in this world, may, however, labour successfully for the glory of the Almighty and the good of mankind.

LESSON CXVI.

THE BLESSINGS OF THIS LIFE GREATER THAN THE EVILS OF IT.

NOTHING is more calculated to comfort us in disappointment and distresses, than the admitting it as a principle, that there is more good than evil in the world. Let us consult the most wretched of men, and ask, if he can mention as many causes for complaint as he has motives for gratitude. It will appear, that, however great his misfortunes may be, they are not equal to the multitude of blessings he has received in the course of his life. To prove this truth more clearly, let us reckon the days we have passed in health, and the small number in which we have been sick: to the few vexations and sorrows we experience in domestic and civil society, let us oppose the many pleasures they afford us; let us reckon the satisfaction we felt when we escaped any danger, or gained any victory over ourselves, or had done any virtuous or sensible action; let us reckon all the blessings we remember to have enjoyed, and consider, at the same time, that we can recollect but the smallest part of them; let us be convinced, that it is our being accustomed to blessings that makes us so sensible of evils, that new prosperity makes us forget the former, and that, if the impressions of our misfortunes are so deeply engraved in our memories, it is because they seldom afflict us; let us compare the happy events we remember, though but the smallest part of what we have enjoyed, to the evils, the use of which we are not yet acquainted with. Wherefore, then, does man think so little of the continual proofs he receives of God's goodness? Why does he love to see the gloomy side of things, and torment himself with unseasonable cares and anxieties? Divine Providence surrounds us with pleasing objects? He has bestowed his blessings impartially throughout the world; and no man has a right to complain, but, on the contrary, many just reasons for praising and thanksgiving. Even the trials he now and then sends us have most merciful views, which we shall one day acknowledge. His almighty and paternal hand protects us, and his eyes are ever upon us.

LESSON CXVII.

THE ENMITY BETWEEN ANIMALS.

THE eagle is a terror to the inhabitants of the air. The tyger lives by slaughter on the earth, the pike in the water, and the mole under the ground. This antipathy among animals is an excellent proof, that all is for the best; take them in the whole, and it is certainly an advantage that some should subsist on others: for on one hand, were it otherwise, a great number of species of them could not exist; and, on the other hand, it makes those useful instead of hurtful. Insects, and many reptiles, feed on carrion. Others fix in the bodies of certain animals, and live on their blood and flesh; and those same insects serve as food to others. Carnivorous animals, and birds of prey, kill creatures to feed upon them. There are some species which multiply so very fast, that they would be a burden to us, were there not a stop put to such increase. If there were no sparrows to destroy insects, what would become of the fruit and flowers? Were it not for the ichneumon, which, as they say, seeks the eggs of the crocodile to destroy and break them, this terrible animal would probably become much too numerous. Great part of the earth would be a desart, and many sorts of creatures would never exist, were there no carnivorous animals. It may perhaps be said, that they might live on vegetables; but if so, our fields would be scarce enough to feed the sparrows and swallows. It would also be necessary to change the construction of the carnivorous animal body for that purpose; and how could fish subsist, were they not to feed on the watery inhabitants? It is consistent with the plan of the world, that one animal should live on another: therefore the carnivorous animals are indispensable links in the chain of beings: but, for this same reason, their number is small in comparison of useful animals. Alas! it must be confessed to the shame of humanity and Christianity, that there are also among men fierce and cruel destroyers; with this difference, that their hostilities are more frequent, and that they often make use of more dark and secret means to hurt one another. The intention of God is, that every man should make himself useful to his fellow-creatures, and, as much as possible, render their lives agreeable and happy. Let us not oppose his merciful views, but endeavour to live in peace and harmony, following the example of our Saviour, in loving and endeavouring to make each other happy.

LESSON CXVIII. FORTIETH WEEK.

ON OUR INDIFFERENCE TO THE WORKS OF NATURE.

WHAT is the reason of our indifference and coldness in relation to the works of nature? An answer to this question may give rise to many important reflections. One of the causes of this indifference is *inattention*. We are so used to the beauties of nature, that we neglect to admire the wisdom of him whose impression they bear; and are not as grateful as we ought to be, for the numberless advantages which result from them. There are too many people who drink of the stream, without reflecting from whence proceed the blessings they enjoy, and without acknowledging the goodness and wisdom of him who bestows them. Thus men, though endowed with the most excellent faculties, which enable them to enjoy a greater share of nature's blessings, scarce ever think of the source from whence they flow. Many, through ignorance, are unacquainted with the most common objects! They every day behold the sun rise and set. Their meadows are moistened sometimes with rain or dew, and sometimes with snow. The most wonderful revolutions happen before their eyes every spring, but they do not take the trouble to enquire into the causes and purposes of these several phenomena; and in that respect live in ignorance. It is true, that there always will be things incomprehensible to us, were we to study ever so much; and we are never more sensible of our limited understandings than when we undertake to search into the operations of nature. But we may at least acquire an historical knowledge of it; and the lowest ploughman may comprehend how it happens, that the seed he sows in the ground shoots and springs up, if he will take the trouble to inform himself of it. We generally value things according to our interest or fancy. Our self-love is so unreasonable, and we know so little our real interest, that we despise what is most useful to us. Corn, for instance, is most indispensably necessary to our subsistence, and yet we behold entire fields covered with this useful production of nature, without attending to it. Many neglect the contemplation of nature through indolence. They love ease and sleep too well, to take hours from them in order to contemplate the starry sky. They cannot resolve to rise early enough to behold the sun rise. They would dread the fatigue of stooping towards the ground, to observe what admirable art there appears in the formation of the grass. And yet these people, so fond of their ease, are full of zeal and activity when the indulgence of their passions is the object. A number of people despise the works of nature from irreligion. They have no taste for piety, or the obligations it prescribes. To praise God, to love him, and to acknowledge his blessings, are disagreeable duties to them. We have but too much reason to believe, that this is one of the principal causes of the indifference of mankind to the beauties of nature. If they were desirous of keeping the first and great commandment above all other things, they would take every opportunity of improving and increasing that knowledge. It is certain, at least, that very few study properly, or take a pleasure in the works of Providence. Have we eyes, and shall we not contemplate the wonders which surround us on every side! Have we ears, and shall we not listen to the hymns, which every part of the creation chaunts to the praise of the Creator!

LESSON CXIX.

UPON SEVERAL NOCTURNAL METEORS.

IN weather nearly serene, we often observe a circular light, or great luminous ring, round the moon, which we call halo, or crown. Its outline has sometimes the faint colours of the rainbow in it. The moon is in the middle of this ring, and the intermediate space is generally darker than the rest of the sky. When the moon is full, and much above the horizon, the ring appears more luminous, and is often of a considerable size. It must not be imagined that this sort of crown is really round the moon. We must seek the cause of it in our atmosphere, where the vapours occasion a refraction of the rays of light which penetrate through them, and produce this effect. There appear sometimes round, or, one side of the real moon, some false ones, which we call mock moons. These are apparently of the same size of the moon, but their light is paler. They are scarce ever without circles, some of which are coloured like the rainbow, whilst others are white, and several of them have long and luminous tails. These also are but illusions produced by refraction. The light of the moon falling on watery, and often on frozen vapours, refracts in different ways, and separates into coloured rays, which reaching our eyes, double the image of the moon. Sometimes, though very seldom, we see by moon-light, after a heavy rain, a lunar rainbow, with the same colours as that of the solar, except that they are more faint. This meteor is also occasioned by refraction.

When sulphureous and other vapours take fire in the higher atmosphere, we often observe streaks of light dart swiftly like rockets. When these vapours collect into a heap, take fire, and fall down, we think we see little balls of fire fall from the sky; and as, at that distance, they appear as large as a star, they are for this reason called falling stars. Some people fancy they are real stars, changing their place. Great balls of fire have also been seen more luminous than the full moon, with tails sometimes trailing after them. They are probably sulphureous and nitrous vapours, which accumulate and take fire; for they generally traverse the air with great rapidity, and frequently burst with a great noise; and when the inflammable particles are of a very different nature, they disperse without noise in the upper regions of the atmosphere. The little flashes seen in the summer evenings so often after great heats, are produced by the vapours in the atmosphere. These flashes, properly speaking, are reverberations of lightning, which is at too great a distance for us to hear the clap of thunder attending it. Of all the nocturnal appearances, none is more remarkable and splendid than the aurora borealis. It is generally observed from the beginning of autumn till spring, when the weather is calm and serene, and when the moon does not give much light.—The aurora borealis is not always the same. It is usually towards midnight that a light like the dawn of day appears. Sometimes we observe streaks of light, white and luminous clouds, in a continual motion. But when the aurora borealis rises in all its perfection, we generally see, if the weather be calm and clear, towards the north, a dark space, a black and a thick cloud, the upper part of which is edged with a white luminous border, from whence dart rays, brilliant sparks, and resplendent pillars; which, as they rise, every moment grow yellow and red; afterwards meet, unite, and form luminous thick clouds, which terminate at last in pillars of all colours, white, blue, orange, or the finest purple, from whence continual rays of light dart out; and it is then that this object is in its full splendour and beauty.

The meteors just mentioned render the long nights of the northern nations light and agreeable. When we behold these magnificent scenes, let us silently adore our Creator. The morn declares his majesty; the hosts of stars, and the mild light of the aurora borealis, display his greatness.

LESSON CXX.

AMPHIBIOUS ANIMALS.

BESIDES four-footed beasts, birds, and fishes, there is a sort of animal which lives either in or out of water, and is on that account called Amphibious. They are all cold, and something melancholy and forbidding in their look. Several of them are venomous. Instead of bones, they have only gristles. Their skin is sometimes smooth, sometimes scaly. Almost all of them live by prey, which they obtain by cunning or strength. They can in general support hunger a long time, and appear to us, to live a hard life. Some of them walk, and others crawl; which forms them into two classes. To the former those with feet belong. The tortoises, which are of that class, are covered with a strong shell like a shield. The land-tortoise is the smallest. Some sea tortoises are five yards long, and weigh from eight to nine hundred pounds. There are different sorts of lizards; some smooth, others scaly; some with wings, and some without. Among these we reckon the crocodile; and the chameleon, which lives on flies, spiders, and insects. Of all animals the crocodile is the most dreadful. This amphibious creature, which comes out of an egg not larger than the egg of a goose, grows from twenty to thirty feet long. It is voracious, cunning, and cruel.

Serpents form the second class of amphibious creatures. They have no feet, but crawl, with a sort of winding vermicular motion, by means of scales and rings with which their bodies are covered. Their back-bones are constructed in a particular manner favourable to this motion. As the serpents can stretch their jaws considerably, they sometimes swallow animals thicker than their own heads. Some kind of serpents have fangs in their mouths which they extend when seizing their prey; and it is by this means that they slip poison into the wounds they make, which comes out of a bag placed at the root of the fangs. The serpents provided with the arms just mentioned, make but a tenth part of the whole species; all the others are not venomous, though they attack men and animals with as much fury as if they could hurt them. The rattlesnake is the most dangerous of any. It is generally three or four feet long, and as thick as the thigh of a full grown man. Its smell is strong and offensive. It seems as if nature had given this, as well as the rattle, to this creature, in order to warn mankind of its approach. It is more furious and dreadful when it rains, or when hunger torments it. It rolls itself up, rests upon its tail, darts upon its prey, gives the wound, and retires again, in a very short space of time, as it never bites till it rolls itself up: dreadful as the rattlesnake is, it cannot conceal its approach. It is also remarkable, that Providence has opposed to this animal an enemy which can conquer it: the sea-hog every where seeks the rattlesnake to devour it, and a child is strong enough to kill the most terrible of these reptiles: a very slight blow with a stick upon its back kills it instantly, or at least in a quarter of an hour. How unjust also would it be to consider nothing but the mischief these do us, without reflecting on the advantages resulting from them? Some serve for food; others supply us with medicine; and the tortoise, for its shell, is of very great value. The wisdom and goodness of the Universal Parent appears as conspicuously among amphibious animals, as in every other part of creation.

LESSON CXXI. FORTY-FIRST WEEK.

THE FACULTY OF SPEECH HOW VALUABLE IF NOT ABUSED.

THERE is nothing extravagant in all that has been said to enhance the value of the gift of speech. It is the highest prerogative of man, and places us in a rank very superior to animals: for whatever traces may have been remarked in them of sounds to express their wants, &c. this can never be compared to human speech, which serves us to pursue a course of conversation, introducing all sorts of subjects, to communicate to others our ideas and wants. The rules of conversation may be reduced to three heads: it ought to be a means of instruction, a bond of society, and a source of pleasure. Instruction is the first thing a man requires on entering into the world. If he be not then as a blank paper, the characters that are traced in his mind are so superficial and confused, that he wants assistance to make them clearer, and to impress them more strongly. Accordingly, the conversation of the first years of our life are mostly devoted to instruction: we ask the questions which our curiosity suggests from every new object, and if we attend, each answer increases our store of ideas. But the age of infancy, or even of youth, to which we limit this sort of conversation, is not enough. There is no time of life in which we may not obtain information. A sensible man may learn something out of every conversation, by leading others to speak on subjects they are best acquainted with, and which he himself does not know. We meet persons who have travelled, who have been witnesses to certain interesting events; it is in our power to gain all they know, and will only cost us a little attention. We converse with a friend, whose courses and studies agree with our own. What can we do better than to communicate our ideas mutually, to assist each other in our common enquiries, and to resolve together the difficulties which may embarrass us? It has been often said and proved, that the condition of men would be most deplorable, without the sweets of society. But what enables us to form societies? It is speech and conversation. Recreation is an essential part of life, as it gives us strength to fulfil the duties of it: none so natural, or so much within the reach of all the world, as engaging conversation, which makes time fly sweetly, and leaves the mind cheerful and composed. But is it thus that men converse? Are these rules observed? Alas, they are but too much neglected. Those first years, devoted to study, are scarce over, when a young man, impatient of restraint, shakes off the yoke. He is ashamed to seem ignorant of any thing, and takes great care to avoid the least appearance of diffidence, which might give suspicion there was any thing in the world he did not know. The most likely means of pleasing in society, is to evince a constant disposition to be interested in all that others say to us, and to listen to them with satisfaction, never interupting them in order to speak ourselves. I do not, however, lay it down as a precept, to restrain one's self continually; for it is only by an unanimous consent of men desirous of information, scrupulous not to offend their neighbours, and attentive to please, that we can hope to see those abuses banished, and thus to make a rational use of a faculty intended to ennoble and to bless mankind.

LESSON CXXII.

THE EFFECTS OF FIRE.

NOTHING in nature can exceed the violence of fire; nor can we, without astonishment, reflect on the effects it produces, and the extreme swiftness of its operations. There is one effect of fire which falls within every one's knowledge, that of dilating the bodies it penetrates. Iron screws or pins which have been made to fit into a metal plate, swell so much if put into the fire, that they go in with difficulty; but as soon as they are cold, they are very easily taken out. This dilation produced by fire is still more visible in fluid bodies, such as wine, beer, and particularly in the air. If it were not for this property, the thermometer, by which we calculate the different degrees of heat, would be quite useless. Observe the effect of fire on inanimate and compact bodies; how soon it melts and changes them, part into fluid matter, and part into a solid, or a different sort. It communicates fluidity to water, oil, fat, and to almost all metals. What renders these bodies susceptible of this change is, that their combination is more simple, and the parts which compose them are more homogeneal than in other bodies; therefore the fire penetrates the more easily into their pores, and sooner separates the parts. This also causes these kinds of substances to evaporate when the fire penetrates in great quantity, and with violence, through them. Some solid bodies undergo other sorts of changes. Sand, flint, slate, and spar, vitrify in the fire; while clay turns into stone. Marble, calcareous stones, and chalk, turn into lime. The variety of these effects does not proceed from fire, but from the different properties of the matter on which the fire acts. It may produce three sorts of effects on the same body, that of melting, vitrifying, and reducing to lime, provided the body be composed of the three several matters. The fire of itself produces nothing new; it only discovers parts which were concealed in those bodies. It operates in two ways upon fluids, making them boil and reducing them to vapours. These vapours are formed of the most subtile parts of the fluid, joined with particles of fire. They rise up because they are lighter than the air. In regard to living creatures, fire produces throughout their whole bodies the sensation of warmth. The life of man could not be preserved without this element, as we require a certain quantity of fire in our blood to keep it in motion. We every moment breathe new air, in which there is always some fire necessary to preserve this warmth and motion; whilst, on the other hand, we reject the air, which had lost its spring in our lungs, and was loaded with superfluous humours. By the union of fire and air the seasons return: the moisture of the soil, and the health of man are preserved. By means of fire, water is put in motion, without which it would soon lose its fluidity. By the gentle motion it keeps up in all organized bodies, it gradually brings them to perfection. It preserves the branch in the bud, the plant in the seed, and the embryo in the egg. It prepares our food properly. It contributes to the formation of metals, and makes them fit for use. When we collect together the several properties of fire, we find, that the Creator, by that means has spread a multitude of blessings over our globe; which ought to make great impression on our hearts, and teach us to love the Author of our being, and inspire us with contented minds.

LESSON CXXIII.

THE INEXHAUSTIBLE RICHES OF NATURE.

NATURE is so bountiful to us, so abundant in means to supply the wants of every creature, and so rich in gifts, that they can no more be numbered than the drops of the ocean. How many things do we require, during a life of sixty years, for eating, drinking, clothing, and for the sweets and conveniencies of life; for pleasure, amusement, and society, without mentioning extraordinary cases and unforeseen accidents? From the king to the beggar, in all situations, conditions, and ages of men, each man has his particular wants. What suits one will not suit another: and they all require different means of subsistence. Yet we find that nature can answer all these demands, and that each individual is supplied with all the necessaries of life.—Since the first existence of the world, the earth has never failed to open her bosom. The mines have never been exhausted. The sea affords subsistence to numberless creatures. The plants and trees constantly bear seed, which shoots in due season, and becomes fruitful. Beneficent nature varies her riches, that one place may not be too much exhausted; and when some sorts of plants or fruit begin to diminish, others are produced; and it is so ordered, that the instinct and taste of mankind should lead them to the most abundant productions. Nature is a wise economist, and takes care that nothing is lost. Insects serve as food for larger animals, which in their turn are useful to man. If they do not afford us food, they furnish us with clothes, with arms, and means of defence; and if for none of these, they at least supply us with salutary medicines. Even when diseases sweep off some species of animals, nature repairs the loss by the increase of others. Not even the dust, the carrion, or putrid corrupted matter, but has its use, either as food for insects, or for manure to enrich the earth. How beautiful is nature! Her finest clothing requires only light and colours. She is abundantly provided with them; and the scenes she presents are continually varied, according to the points of view in which they are seen. Here the eye is struck with the beauty of form; there the ear is charmed with melodious sounds; and the smell is indulged with agreeable perfumes. In other places art adds new embellishment to nature, by a thousand industrious works. The gifts of nature are so abundant, that even those which are continually made use of never fail. Her riches are spread over the whole earth. She varies her gifts according to the different countries. By means of commerce, she connects different nations; and the hands through which her gifts pass, make them more valuable by the continual circulation. She combines and mixes her gifts as the physician does his medicinal ingredients. The great and the small, the handsome and the ugly, the old and new, combined and mixed with art, form one whole equally useful and agreeable. Such are the inexhaustible riches provided by the great Creator.

LESSON CXXIV. FORTY-SECOND WEEK.

PETRIFACTIONS.

THE transmutation of several substances from the animal and vegetable kingdom into the mineral, is a circumstance in natural history well worthy our attention. The first thing to remark in petrifacations is their exterior form, which shows, that these fossils have undoubtedly belonged either to the animal or vegetable kingdom. It is very unusual to find human petrifactions or those of quadrupeds. The most extraordinary skeletons met with in the earth, are those of elephants, which are found even in many parts of Germany. Petrifactions of aquatic animals are frequently met with. Sometimes fish entirely whole and perfect, even to the smallest scales; and a number of shell-fish, and little worms are found changed into stone in the bowels of the earth. Sea-petrifactions are found in great abundance all over the world. Some on the tops of mountains, and others in the earth, at different depths. All sorts of petrified plants, or pieces of plants, are met with in several beds of the earth; but there is often the impression only left, the bodies themselves being destroyed; and in some places whole trees are found buried more or less deep in the earth, and turned to stone. These do minerals. The variety of stones is very great; their form, colour, size, and hardness, are very different. All sorts of metallic and saline particles are found in them; and from hence proceed minerals and precious stones. In the last class of stones, there are some with fibres, and a sort of leaves; such as slate, talc, the lithophites, or marine stony plants, and the amianthus, or the stony flower of the mine; which leads us from the minerals to the vegetables. The plant which appears to be the lowest among the vegetables, is the truffle. Next comes the numerous species of mushrooms and mosses; between which the hoar or mould seems to take its place. All these plants are imperfect, and only form the limits of the vegetable world. The more perfect plants divide into three sorts, which are dispersed over the whole earth; grass, shrubs, and trees. The polypus seems to unite the vegetable to the animal race. From the outward appearance, this singular production would only be taken for a plant, if it was not known to perform real animal functions. This zoophite forms the link between plants and animals. Worms are the lowest of the animals, and lead us to insects. Those worms which have their bodies enclosed in shells, seem to unite insects to shell-fish. Between them, or rather next to them, come reptiles; these, by means of the water-snake, are linked with the fish. The flying-fish leads us to the bird species. The ostrich, which has legs something like a goat's, and which rather runs than flies, seems to link the birds with the quadruped. The ape joins hands with man and beast. There are gradations also in human nature, as well as in every thing else. . . . .

What has been said is sufficient to show, that every thing in the universe is closely linked together. There is nothing without design; nothing which is not the immediate effect of something which preceded it, or which does not determine the existence of something which is to follow. Nature goes by degrees, not suddenly; from the component to the compound, from the less to the more perfect, from the nearest to the more distant, from the inanimate to the animate, from bodily to spiritual perfection. From the grain of sand to the cherubim, every thing owes its existence and perfection to the great Author of the universe.

LESSON CXXVI.

DIFFERENT SORTS OF EARTH.

WE can only form conjectures of the inside of the earth. Those who work in the mines have never been able to go lower than 900 feet. If they attempted to go further, the too great pressure of the air would kill the men, supposing even they could protect themselves from the water, which fills more and more in proportion as they descend lower. The inside of the earth must consequently be in a great measure unknown to us. The labours of the miners have scarce even reached below the first coat of it. All that we know is, that when they dig some hundreds of feet, this coat is found to be composed of several different layers or beds, placed one over another. These beds are much

minerals. The variety of substance, thick-
their form, colour, size ons, vary considerably
different. All sorts her. Generally under
ticles are found in gardens they find white
ceed minerals a ; but sometimes the sand,
class of stone mix by turns. In comparing
a sort of le which have been made, the
phites, or ppears to be that which divides
thus, or veral sorts of earth.
leads rth is composed of putrid vegetable
The substances; it contains salts and in-
the le matter: this is, properly speaking,
nu White clay is more compact than the
b earth, and retains water on its surface
er. Sandy ground is hard, light, and dry;
does not retain water, or dissolve in it.
Marshy ground contains salt of vitriol, which is too sharp for the plants. Chalk is dry and hard; some plants, however, grow in it: and some even in stony ground. The smoothest stones, however bare of earth, are covered with moss, which is a vegetable; and we see birch growing between the stones and in the crevices of rocks to a considerable height. The Creator has most wisely prepared those different sorts of earth of which the beds are composed: for, to mention nothing more than the principal advantages which result from them, these several beds of sand, gravel, and light earth, give passage to spring water, which filters in running over these beds, becomes soft, and then, dispersing on every side, supplies water for general use: those beds are the reservoirs of springs. It is remarkable that they are to be found in every country on the surface of the earth, and that they are generally composed of a light earth. If it is sometimes mixed with a harder and more

ly soil, it purifies the water so much the
This variety of soil is very useful also
ables. It is from this circumstance
rbs, plants, and trees grow of themselves
ome countries, while they can only be produced by art in others. All that art can do is to imitate nature, which prepares for the plants that come of themselves, the soil, the nutritive juices, and the warmth, most proper for them. The variety of soil will make herbs, trees, and roots, though of the same kind, differ according to the soil they grow in. It often happens in the same soil, that some plants thrive, whilst others fail. The same fruit has a different flavour in one country from what it has in another.

These observations lead us to acknowledge the wisdom with which the Creator has prepared every soil for the production of plants, for the good of his creatures.

LESSON CXXVII. FORTY-THIRD WEEK.

MIGRATION OF THE BIRDS.

THIS is the time when numbers of the birds, which during summer had lived and found food in our fields, woods, and gardens, are going to quit our climate for other countries. There are but few of them which pass the winter with us; such as the woodpecker, the crow, the raven, the sparrow, the wren, the partridge, and the thrush: the rest leave us almost the whole winter. This migration is wonderful in all respects; and if we have not much attended to these creatures while they were with us, let us think of them now they are gone. Some birds without taking their flight very high, or separating one from the other, draw gradually towards the south, to seek the seeds and the fruit they prefer; but they soon return back. Others, which are called birds of passage, collect together at certain seasons, and go away in large bodies into other climates. Some kinds of them are content with going from one country to another, where the air and food draw them at certain seasons. Others cross the seas, and undertake voyages of a surprising length. The birds of passage most known, are quails, swallows, wild ducks, plovers, woodcocks, and cranes, with some others which feed on worms. The quails in spring go from Africa into Europe, to enjoy a more moderate heat: they go in flights, and look like clouds: they often fall through fatigue into ships, and are easily taken. The method of the swallows is different; some cross the seas, but many of them stay in Europe, and hide themselves in holes under ground or in marshes. Wild ducks and cranes also, at the approach of winter, seek milder climates. They also assemble on a certain day, and divide company, generally forming themselves into two lines united in a point, as thus <, with a bird at their head, and the rest in rows, which always extend in that manner. The duck, or crane, which forms the point, cuts the air, and makes way for those which follow; and these always lay their bills on the tails of those which go before: the leading bird is only charged with this commission for a time: he goes from the point to the tail; in order to rest, and he is relieved by another. But all birds of passage do not assemble in flights. Some take the voyage quite alone; others with their mates, and all their family; others in small numbers. They make their passage in a very short time. It has been computed that they may easily fly 200 miles, in flying only six hours a day, supposing them to rest now and then in the day as well as at night. According to this calculation, they might fly from our country, even as far as under the line, in seven or eight days. This has been verified, as swallows have been seen on the coasts of Senegal, on the ninth of October, which is eight or nine days after their departure from Europe. These migrations of the birds cannot be too much admired. Certainly the difference of heat and cold, and the want of food, warns them to change place. But what is the reason, that when the air is so mild that they might remain in it, and find enough to eat, they still never fail to go at the appointed time; and how they know that they will find food, and the proper degree of heat in other climates, are not yet known in a satisfactory manner, because we are not enough acquainted with the nature and instinct of these animals. We may, however, behold in these migrations the wise and beneficent direction of Providence. What wonderful means are made use of to preserve and give food to certain birds; and with what tender care is their subsistence pointed out to them. Let us learn from thence, that every thing throughout the vast empire of nature is planned with infinite wisdom. Is not instinct to the birds of passage what reason is to man? And does it not equally instruct them in this point, of changing place in proper seasons? How ought we to blush at our incredulity, our doubts, and our anxieties, when we reflect on the admirable guidance of Providence!

LESSON CXXVIII.

THE VARIETY OF TREES.

THERE is the same variety in trees as in the vegetable productions. Some are distinguished by their strength and roughness, like the oak; others are tall and slender, as the elm and the fir-tree: there are some, such as the thorn and the box, which never grow high: some have rough and uneven coats, while others are smooth and fine, like the birch, the maple, and the poplar. Some are made use of for ornaments in rich apartments, while others serve for common and more necessary purposes: some are so slight and delicate, that the least wind might blow them down; while others stand unshaken, and resist the violence of the northern blasts: some grow to a prodigious height and thickness, and every year after they are a hundred years old, seems to add to their circumference; while others require but a very few years to come to their full growth. Pliny, in his time, admired those great trees, the shell or bark of which was thick or large enough to be made into sloops to hold thirty people: but what would he have said of those trees in Congo, which, when hollowed out, make vessels to contain 200 men: there are some of this kind at Malabar, which are said to be forty feet in circumference: the cocoa-tree is one of them, a sort of palm-tree, some of which have leaves large enough to cover twenty people. The tullipot, a tree which grows in the island of Ceylon, and for height resembles the mast of a ship, is equally famous for its leaves. They are so immense, that it is said that one single leaf can shelter fifteen or twenty men from the rain. They are so supple and light when dried, that they may be folded up like fans, and appear no larger than a man's arm. There are still on mount Libanus, twenty-three old cedars, so large, a learned person who saw them assures us, that ten men could not encompass one of them: they must therefore be thirty or thirty-six feet in circumference, which does not appear too much for trees some hundreds of years old. The gum-trees which grow in the islands of America are generally twenty-six feet in circumference. There are apple-trees above a thousand years old; and, if we compute the quantity of fruit such a tree bears annually, we must (as has been before mentioned) think with astonishment of the prodigious fertility of a single pippin, which could furnish all Europe with trees of this kind.

The great variety among trees reminds me of the difference we may observe among men, in regard to their situations in life, their way of thinking, their talents, and the good they do. As there is not a single tree in a forest which may not be of some use to its owner, so there is no one in society which may not be useful. One, like the oak, gives an example of firmness, and of unshaken constancy, which nothing can move: another has not equal fortitude, but has more complaisance, and conforms to others: he is flexible as the willow, and yields to a breath of wind: if he is virtuous, he will only comply in lawful and innocent points; but if he is indifferent to his duties, he will always embrace the strongest side. How different the trees may be from one another, they all belong equally to the Sovereign of the world; all are nourished by the same earth, all are warmed by the same sun, and refreshed by the rain equally. Oh! that all men, however different from each other, would unite in acknowledging that they are all equally God's creatures, all equally subject to his power, the objects of his tender mercies; all indebted to him for their existence and support, as well as for the talents with which they are endowed.

LESSON CXXIX.

THE TEMPERATURE IN THE DIFFERENT CLIMATES OF THE EARTH.

IT seems as if the temperature and warmth of countries must depend on their situation in respect to the sun, as it casts its rays in the same manner on all countries which are in the same latitude. But experience tells us, that heat and cold, and all the temperature, depend on many other circumstances. Seasons may be very different in places under the same parallel; and are, on the contrary, often very much alike under very different climates. Therefore, as accidental causes may make the heat very different in the same latitude, and as it is very far from being such as the distance of the sun would seem to promise, it is difficult to determine exactly the seasons and temperature of each country. The neighbourhood of the sea renders the climate milder. England and the coasts of Norway are strong proofs of it: the sea may be covered with ice near the shore, because it mixes there with fresh water: but it never happens at any considerable distance from land, both from the salt, of which the sea is full, and from its being in continual motion. By the sea not being frozen in winter, the climate of the adjacent countries is milder. On the contrary, the higher a place is above the sea, the colder it is. The air is not only thinner there, and consequently contains less warmth, but the greatest part of the heat produced by the earth's reflecting the rays of the sun falls on low places and valleys, and does not reach heights. Quito is almost under the line, but the heat is moderate from its high situation. In general, those sorts of countries have serene and clear air, and an equal temperature. High mountains attract clouds, which occasion more frequent rains and storms in hilly countries than elsewhere; and it has been observed, that it scarcely ever rains in the plains of Arabia. Countries where there are great extensive forests are very cold: the ice melts more slowly there in winter, because it is covered with the shade of the trees. The ice makes the upper air cold, and this delays the thaw. Another circumstance also tempers the heat of warm climates; their days are not long, and the sun does not remain long above the horizon. In colder countries the summer days are very long, which makes them warmer than could be expected. The serenity of the sky, the clear light of the moon, and the long twilights, render long nights supportable. Under the torrid zone, the seasons are not so much distinguished by winter and summer, as by dry and wet weather; for when it ought to be summer, that is, when the sun is most above the horizon, and its rays fall in as direct a line as possible, then come the rains, which fall more or less for some time. But in those countries, the most pleasant season is that in which the sun is at the lowest. In the countries beyond the tropic, the weather is generally more uncertain than within the tropic. It is in spring and summer that the winds are highest. In winter the ground freezes more or less deep, but seldom in our climate more than three feet. In more northern countries, it freezes deeper in winter, and only thaws a few feet in summer. Stagnant waters, and even rivers, are covered with ice first near the shore, and then over the whole surface of the water. The different qualities of the soil, as they retain more or less of acquired heat, contribute also in some degree to vary the climate.

In thus regulating the seasons and climates of the different countries, the Creator has made every part of the earth habitable; and to the great satisfaction of all feeling hearts, it is certain, that the people of the most distant countries, without even excepting those who live under the line or under the pole, enjoy the portion of happiness suited to their nature and destination. Each country has its advantages and inconveniences, in such equal proportion, that it would be difficult to decide which of them merits the preference. There is not a corner of the world in which the Almighty has not displayed his goodness.

LESSON CXXX. FORTY-FOURTH WEEK.

ATMOSPHERE OF THE EARTH.

THE air which surrounds the earth is not so pure and subtile as ether: for it is loaded with all the particles or vapours which are continually rising out of the earth, and particularly from the water: this is called atmosphere. Its lower region, that is to say, what is nearest to the earth, is pressed upon by the upper air, and from thence becomes more thick and dense. This is experienced by those who go to the top of high mountains. Their breathing becomes more painful in proportion as they ascend. But it is impossible to ascertain the exact height of the atmosphere, because we cannot rise very high in the air.—The atmosphere is divided into three regions. The lower one reaches as high as where the air receives no warmth from the rays which the earth reflects. The middle region begins where the preceding one ends, and goes as high as the highest mountains, or even as far as the highest clouds, and in the space where the hail, rain, and snow collect. This region is much colder than the lower; for it is only warmed by the rays which fall perpendicularly, and in a direct line upon it. But the third is probably still colder. It reaches from the middle to the extremity of the atmosphere, and we cannot precisely ascertain its limits.

The particles which rise out of the earth, and form the atmosphere, are of different natures. They are watery, earthy, metallic, sulphureous, &c. Now, as some abound more than others in certain parts of the earth, it occasions great variety in the air, and this difference is very perceptible even at a little height. A heavy air is more wholesome than a light one, because it promotes the circulation of the blood, and insensible perspiration. When the air is heavy, it is generally serene; whereas a light air is always attended with clouds, rain, or snow, which makes it damp. Vapours increase the weight of the air: and particularly, when the heat sends them up very high, the air is still light, notwithstanding the watery vapours with which it is filled. The best air, is that which is rather heavy than light, neither too dry nor too moist, and but little or not at all mixed with noxious vapours. It is in the atmosphere that the clouds, the rain, snow, dew, thunder, and several ethereal phenomena, are formed. It is to the atmosphere also that we owe the morning and evening twilights. As the rays break and bend in this mass of air, we see them before the sun appears, and we enjoy them after it has set. Let us then acknowledge with gratitude the wisdom and goodness of the Creator, who has regulated every thing in nature, so as to be most conducive to the happiness of the beings he has formed.

LESSON CXXXI.

BEASTS OF BURDEN.

THESE sorts of animals do us so much service; and are so useful to us, that it would be ungrateful not to examine them with care. Of all domestic animals, the horse is of the most service. He submits tamely to every sort of labour, for a frugal and moderate subsistence. Giving himself up entirely to his master, refusing him nothing, he makes use of all his strength, exhausts himself, and even dies in trying to do more. Nature has given him a propensity to love and fear mankind; and made him very sensible to the caresses which render his servitude pleasing. He is the best proportioned and finest shaped of all the animals. Every part of him is elegant and regular. The exact proportions of his head give him a light and lively look, which is still heightened by the beauty of his chest. His carriage is noble, his step majestic, and every limb seems to mark animation, strength, courage, and pride. The ox has not the pleasing elegance of the horse; but it compensates for these by the important services it does to mankind. It is strong enough to draw heavy loads, and is content with poor food. Its blood, its hide, flesh, fat, and horns may be applied to several uses; and its dung is excellent manure for the ground. A very remarkable circumstance in this animal is the construction of its organs of digestion. It has four stomachs, the first of which can contain forty or fifty pounds weight of food. The third stomach has eighty-eight folds or ridges, which serve to digest, whilst sheep or goats have but thirty-six. The ass, however void of beauty in its appearance, and despised as it may be, has many excellent qualities, and is very useful to us. It is not fiery and impetuous like the horse; but quiet, simple, and always the same. It has no pride. It goes smoothly on. It carries its load without noise or murmur. It is temperate, both as to the quantity and quality of its food. It is contented with thistles, and the hardest and worst herbs. It is patient, vigorous, and indefatigable; and is of continual and essential use to its master.

How is it possible that we can daily make use of these animals, without reflecting on the Creator, who formed and gave them the means of being so useful to us? It is a circumstance worthy the attention of a reflecting mind, that the number of beasts of burden is infinitely greater than that of wild beasts. If the latter multiplied as fast as the former, the world might soon be a desart. Can we reflect without gratitude on that goodness which has given us the command of those animals; the strength or skill to subdue them; the right to make use of them; to change as we please their nature; to force them to obedience; and to employ them as we choose. If animals had not been impressed with a natural fear of mankind, it would be impossible to subdue them by force. Since therefore it is to God alone we owe our power over them, we should not abuse it by treating those creatures ill.

LESSON CXXXII.

THE WINTER SOWING TIME.

GREAT part of the food intended for us, and for many animals, is at this time deposited in the ground. The farmer has sowed his winter corn, and begins to enjoy rest from his labours. He will soon have the satisfaction to see his fields gradually covering with a beautiful verdure, and giving the promise of a plentiful harvest. Nature at first, indeed, works in secret, while the seed is opening; but its operations may be discovered, by taking some of the grains out of the ground when they are beginning to shoot. Two days after the grain is put into the earth, it is swelled by the juices, and begins to shoot. The shoot is always at one of the ends of the grain; and that part of it which is next the outside of the grain is the little root of the future plant. The part turned inwards is the stalk and head of the plant. The corn, when sowed, generally begins in twenty-four hours to pierce through the coat, and unfold itself. The root and stalk become visible. The root is first wrapped up in a bag, which it bursts open. Some days after, other roots shoot out of their sides. The fifth or sixth day, a green stalk springs up above the ground. It remains some time in that state, till the fine season comes, when the ear of corn breaks out of the coats, in which it had been enclosed, and protected from cold and uncertain weather.

All this naturally leads us to reflect on the nature of human life. Our present existence is but the seed from whence everlasting life is to spring. We are here in the sowing season, and we see but little as yet sprung forth. We cannot here behold the fruit in maturity, or the corn in perfection. The harvest will not be reaped on earth. We live in hope. The farmer has sowed his field. He leaves his grain to the rain, the storms, and the heat of the sun; and he sees not what will be the result. This is our situation in regard to spiritual seed. Let us not be vain of what we sow, neither let us be discouraged, if we do not reap the fruits of it. Let us not be weary of "sowing to the spirit;" and perhaps our good works, however trifling in themselves, may have happy consequences hereafter. Now that our ground is sowed, let us wait patiently, and without anxiety, till we reap the fruits of our labour.

LESSON CXXXIII. FORTY-FIFTH WEEK.

THE MEASURE AND DIVISION OF TIME.

TIME is measured and divided according to the motions of the celestial bodies, and particularly by those of the sun and moon. Those two globes have the most influence on the state of mankind. The course of the moon only serves to measure the time on our earth; that of the sun certainly regulates the time in all the planets which move round it. Day is the space of time in which the sun makes a revolution round the earth; or, to speak more justly, it is the time our earth takes in turning round its own axis. The part of this time during which the sun is above the horizon, we call artificial day. This is when the light is determined by sun-set and sun-rise. The time of darkness, or when the sun is below the horizon, we call night. The day and night together make the solar day. We divide it into 24 parts, called hours: each hour is divided into 60 equal parts, called minutes; each minute into 60 seconds; and each second into 60 thirds. This division of the day into hours, minutes, &c. is marked by the motion of the shadow on a sun-dial, or by the hand of a clock. A good sun-dial constantly marks the hour truly, but clocks or watches require to be often regulated. Most Europeans, in common life, begins their hours of the day at noon, from whence they reckon twelve to midnight, and twelve more to noon again. The Italians begin the day at sun-set, and reckon twenty-four hours from thence to the following evening. The Turks begin their day at a quarter of an hour after sun-set; they reckon from thence twelve equal hours, and, when those are passed, they reckon twelve more to the following evening. The Jews begin the day at sun-set; from thence they reckon twelve equal hours to sun-rise, and as many to sun-set; consequently, their hours of day are longer or shorter than those of night, in proportion to the length of the day and night. A week is the space of seven days. A solar month is the time the sun takes in traversing a sign of the Zodiac: but those months do not begin or end exactly as that body enters a new sign. The lunar month is the space of time between two new moons; that is to say, twenty-nine days twelve hours, and forty-four minutes. The solar year consists of twelve solar months, which, is the time the sun takes in traversing the twelve signs of the Zodiac; and there are generally reckoned in that time, three hundred and sixty-five days, five hours, and forty minutes. These are now the years in most parts of Europe. The lunar year takes in twelve lunar months, or twelve courses of the moon round the earth. It is composed of three hundred and fifty-four days, eight hours, and forty-eight minutes. The Jews and Turks make use of this reckoning; but in order to make it answer to the solar year, they often add a whole month to it. Our common year begins ten or twelve days after the sun has entered Capricorn.

This measure or division of time, however unimportant it may appear in itself, may become of much consequence, by the application of it to the moral life of man. The hours, days, weeks, months, and years, of which our earthly life is composed, were given us in order that we should fulfil the design of our existence, by making a good use of our faculties. But how do we employ this precious time! Minutes appear to us too trifling to attend to. It is certain, however, that he who does not reckon minutes will lavish hours also.

"Teach us, O Lord, so to number our days, that we may apply our hearts unto wisdom."

LESSON CXXXIV.

THE END OF SUMMER.

THE sun is now taking leave of our world. Every thing is changed with us. The earth, which was lately so beautiful and fruitful, is now becoming gradually barren and poor. We no longer behold that fine enamel of the trees in blossom, the charms of spring, the magnificence of summer, those different tints and shades of verdure in the woods and meads, the purple grapes, nor the yellow harvests which crowned our fields. When the earth is stripped of corn, grass, and leaves, nothing is to be seen but a rough and rugged surface. It has no longer that beautiful appearance which they produced over a vast country. The birds no longer sing; nothing now recals to the mind of man that universal joy which reigned throughout all animated nature. Deprived of the pleasure which the melodious songs of the birds afforded, he hears little now but the murmuring streams and whistling winds, constantly the same dull sounds; a musty smell of plants and leaves decaying, and a cold damp air, are disagreeable to the feeling. But in the midst of these melancholy prospects, let us still observe, that nature faithfully fulfils the eternal law prescribed to her, of being useful at all times and seasons of the year. Winter draws nigh; the flowers are going; and even when the sun shines, the earth no longer appears with its usual beauty. Yet the country, stripped and desart as it is, still presents to a feeling mind the image of happiness. We may recollect with gratitude to Heaven, that the fields which are now barren were once covered with corn and plentiful harvest. It is true, that the orchards and gardens are now stripped, but the remembrance of what they bestowed upon us may make us content to bear the northern blasts which at present we feel so sharp. The leaves are fallen from the fruit-trees; the grass of the field is withered; dark clouds fill the sky, and fall in heavy rains. The unthinking man complains at this; but the wise man beholds the earth moistened with rain with a sweet satisfaction. The dried leaves and the faded grass are prepared, by the autumnal rains, to form manure to enrich the ground. This reflection, with the pleasing expectation of spring, must naturally excite our gratitude for the tender mercies of our Creator.

LESSON CXXXV.

THE WANTS OF MAN.

THERE is not a creature on earth that has so many wants as man. We come into the world naked, ignorant, and destitute. Nature has not endowed us with that industry, and those instincts, which the beasts have at their birth. Reason has been bestowed on us, that we should acquire the necessary knowledge and talents. They bring with them at their birth, clothes, arms, and all they want, or they have those natural instincts, which, by following blindly, procure it for them. If they require habitations, they know how to dig or build them; if they want beds, covering, or change of clothes, they know how to spin and weave them, and get rid of their old ones; if they have enemies, they are provided with arms to defend themselves; if they are sick or wounded, they know where to find proper remedies. And we, who are so superior to other animals, have more wants, and fewer means of supplying them, than they have. By not having their instinct to assist our many bodily wants, we make use of our reason, in order to acquire a knowledge of the world, and of ourselves. It is necessary to be active, vigilant, and laborious, to preserve us from poverty, pain, and vexation, and to make our lives pleasant and happy. Reason is, at the same time, the only means to subdue our strong passions, and to prevent us from running into excesses of pleasure, which might be fatal to us. A few examples may convince us of this. If we could obtain, without any trouble, all our food, &c. we should certainly become indolent and idle, and we should pass our lives in shameful sloth. The noblest faculties of man would weaken and grow dull. The bonds of society would be broken, because we should no longer depend on one another. Even children would be able to do without the assistance of their parents, and still less would they want it from others. All human kind would fall again into a state of barbarity. Wild and savage, every one would live, like the brutes, for themselves only. There would be no subordination, no mutual obligations or good offices. It is, then, to our wants that we owe the opening of our faculties, and the prerogatives of humanity. They awaken the mind, create activity and industry, and make our lives more easy and pleasant than those of other animals. Our wants have made us sociable, rational, and regular in our manners; they have given rise to a multitude of useful arts and sciences. In general, an active and laborious life is beneficial and necessary to man. If his faculties and powers are not exercised, he becomes a load to himself, he falls gradually into a stupid ignorance, into gross excesses, and all the vices resulting from them. Labour, on the contrary, sets all the machine into a pleasing motion, and gives so much the more satisfaction and enjoyment, as it requires the more industry, reflection, understanding, and knowledge.

The wants of children, the destitute state in which they come into the world, oblige the parents through pity and tenderness, to take care of them; whilst the children, on their parts, are attached to their parents by a sense of their own helpless state and danger, and submit to be guided and formed by their instruction and example, how to make a proper use of their reason, and to respect morality. Thus they may become worthy men, and lead a virtuous and happy life. With such advantages, we may easily give up those which the animals appear to have over us. We require neither furs nor feathers to clothe us, no teeth or claws to defend us, neither more cunning or natural instinct to procure us necessaries. We find, then, that these wants are the true foundations of our happiness, and the best means which Divine Wisdom and goodness could make use of, in order to direct the faculties of man to the greatest advantage.

LESSON CXXXVI. FORTY-SIXTH WEEK.

FOREIGN ANIMALS.

EVERY part of the world has animals of its own, and it is for very wise purposes that the Creator has placed them in one country rather than in another. The most remarkable animals in the southern countries are the elephant and camel. They surpass all the quadrupeds in size.

The elephant, in particular, appears like a moving mountain, and its bones are like pillars. Its head is joined to a very short neck, and armed with two tusks strong enough to tear up trees, or throw them down. A longer neck could not support the weight of the head, nor hold it up. But to make amends for the short neck, his trunk is very long. He uses it as a hand to convey food to his mouth, without being obliged to stoop for it. He moves, bends, and turns it always, at his pleasure, and makes use of it as an organ of smell; his eyes are small in proportion to the size of his body, but they are bright and full of fire. In a state of independence it is neither sanguinary nor fierce, but of a mild nature, and never makes use of its weapons but in its own defence. It seizes its enemy with its trunk; flings it like a stone at him, and then treads him to death. The elephant eats about 100 pounds weight of grass in a day; but its body being of an enormous weight, it crushes and destroys with its feet more than it consumes in food. Its chief enemy, and often its conqueror, is the rhinoceros, an animal very like the wild boar, that makes use of the horn which grows upon his nose to pierce the belly of the elephant. It requires very little attention to perceive the wisdom of God in the production of the elephant. He has ordained that it should be born in countries abounding with grass, and that it should not become a burden to the earth by multiplying too fast.

The camel is one of the most useful animals in the east; it is admirably adapted to bear the greatest fatigues in the midst of barren desarts and burning sands; being able sometimes to live four or five days without drink, and requiring but very little food in proportion to its size. It browses the few plants and shrubs that grow in the desarts; and when he finds none, two measures of beans and barley serve for a whole day's subsistence. Besides the hump which grows on its back, there is still another singularity in its make: this is a double throat, one of which reaches to the stomach, and the other terminates in a bag which serves him as a reservoir to keep water in. It remains there without corrupting; and when the animal is pressed by thirst, or has occasion to dilute its dry food, it draws up into its paunch part of this water, which moistens the throat, and goes afterwards into the stomach. The common load a camel will bear is from 700 to 800 pounds weight; and with this burden they go two German leagues and an half in one hour; generally travelling twelve or fifteen hours a-day. The fleshy foot of the camel is made to walk on sand, while the horny hoof of the horse would be hurt or burnt by it.

The most remarkable quadrupeds in the northern countries are the elk, the sable, and the reindeer. The first of these animals is large, strong, and finely shaped. Its head something resembles the mule in form, size, and colour; its legs are long and strong; its hair of a light grey. This animal is simple, stupid, and timorous. It finds food every where; but it prefers bark, or the tender shoots of the willow, the birch, or the service-tree. It is extremely swift, and having long legs, goes a great way in a very short time. The sable wanders in the forests of Siberia, and is much sought on account of its beautiful fur. The hunting of this animal is generally the sad occupation of the wretches who are banished to those desarts. The reindeer is an animal of a most elegant, pleasing form, very like a stag. It seeks its own food, which consists of moss, grass, leaves, and buds or shoots of trees. The northern nations draw many uses from them, as has been described in a former part of this work.

What has been said of these foreign beasts may give rise to important reflections. How surprising the difference between the elephant and the mite! In many parts of the world there are animals which could not bear the climate, air, food, or degree of heat they would find in Europe; nor can it be doubted but there are European animals which would neither sustain the heat of the eastern nor the cold of the northern regions.

LESSON CXXXVII.

VARIETY OF WINDS.

THERE are a great variety of winds. In some places they are fixed, and blow always from the same point. In others, they change at certain periods of time, but still by fixed and regular laws. At sea, between the tropics, and some degrees below them, there is a wind which lasts the whole year without any considerable variation. On the north of the line, the wind blows towards the north-east; and on the south of the line, it blows towards the south-east, more or less, according to the position of the sun. This must be understood to mean the wind at open sea; for, if islands or great continents are opposed to it, the direction may be changed to north-east. In the southern parts of the ocean, the wind is generally westerly. The nearer to the coast, the more changeable is the wind, and still more so on land. The constant east wind is chiefly owing to the heat which the sun communicates to our atmosphere.

In the Indian seas there are winds called trade-winds or monsoons, which blow for three or six months of the year from one point, and for the same space of time from the contrary point. These winds have not yet been well accounted for; but certainly we must look for the causes of them in the changes from heat to cold, the position of the sun, the nature of the soil, meteors taking fire, vapours dissolving into rain, and other such circumstances. There are seas and countries which have winds and calms peculiar to them. In Egypt and in the Persian Gulph, there is, during summer, a burning wind, which suffocates and consumes every thing.

At the Cape of Good Hope, there forms a cloud sometimes, which is called the fatal wind, or the ox-eye: it is at first very small, but visibly increases, and soon produces a furious tempest, which swallows up ships, and plunges them into the deep. Variable winds, which have no fixed direction or duration, blow over the greatest part of the globe. It is true, that some certain winds may blow more frequently in one place than in another; but it is not at any regular time that they either begin or end. They vary in proportion to the several causes which interrupt the equilibrium of the air: heat, cold, rain, fair weather, mountains, and even the straits, capes, and promontories, may contribute very much to interrupt their course, or change their direction. There are many other causes, certainly, though not yet known to us, for the different modifications and turns of the wind. One thing particularly remarkable is, what happens every day, and almost in every place, a little before sun-rise: when the air is perfectly calm and serene, at the dawn of day, there comes a quick easterly breeze, at the approach of the sun, which continues some time after it rises. The cause of this must be, that the air being heated by the rising sun, rarefies, and by its dilating, sends the contiguous air towards the west; this necessarily produces an east wind, which we cease afterwards to feel as the air grows warmer. From the same cause, the easterly wind must not only precede the sun always in the torrid zone, but be much stronger also than in our countries, because the sun acts more moderately upon us than it does near the line. In the torrid zone, the wind blows constantly from east to west. A westerly wind is very rarely felt there.

We may observe, that the winds are not the effect of chance, to which no cause can be assigned. In this, as in every thing else, the Creator shows his wisdom and goodness. He has so ordained, that the winds should rise from time to time, and that there should be but very seldom an absolute calm: He regulates the motion, force, and duration of the winds, and prescribes the direction in which they are to blow. Even their being variable is a benefit to us. When a long drought causes animals and plants to grow faint and languid, a sea-wind sends clouds loaded with vapours to moisten the ground, and revive all nature. When this is done there comes a dry easterly wind, to restore the serenity of the air, and to give us fine weather. The north wind clears away a great quantity of icy particles, and carries off the noxious vapours of autumn.—To the sharp north wind, succeeds the southerly wind, which fills the air with an enlivening warmth; and to these continual changes of the wind we owe our health, and the fertility of the earth. Who can make these reflections without adoring God? All the elements are at his command: at his word the storms and tempests roar; they rush from sea to sea, from land to land; and at his command all is calm again. Should we not, therefore, put our whole trust in him? He who directs the winds as he pleases, will he not guide our ways? Whilst at his command all the changes of the wind combine for the good of his creatures, may we not believe that the vicissitudes of life contribute to the real happiness of each individual.

LESSON CXXXVIII.

HUNTING.

HUNTING is one of the chief amusements of a certain order of people at this season; but it is to be wished they did not set such value upon it; for the power man has over animals, and the pleasure he takes in subduing them, is too often mingled with cruelty. Sometimes, it is true, there is a necessity that animals should be put to death, in order to make the use of them for which they were designed, or to prevent an increase that would be hurtful to us: but even then their death ought to be made as easy as possible; and unfortunately this law prescribed by nature is little attended to by sportsmen. Men, in this respect, show themselves more cruel tyrants than the fiercest beasts. Is not the way of hunting a hare or stag dreadful to every feeling heart? Can it be an innocent pleasure to pursue with rage and fury a poor animal which flies from us in violent anguish, till at last, exhausted with terror and fatigue, it falls and expires in horrid convulsions? Is it humanity not to be affected with such a sight, nor to feel compassion at it? To purchase a pleasure by the death of an innocent creature, is purchasing it too dearly. It is a dangerous pleasure, if it makes barbarity familiar to us. It is impossible, that the heart of a man, passionately fond of hunting, should not insensibly lose the sweet feelings of humanity. Such a man soon becomes cruel and barbarous; he finds pleasure in none but scenes of horror and destruction; and, having accustomed himself to be insensible towards animals, he soon becomes so towards his fellow-creatures. Hunting does not appear to me in general an occupation which we can reconcile with the duties we are called upon to fulfil. Without mentioning the loss of time, a loss in itself of consequence, it is certain that hunting dissipates too much, and fills the mind with ideas incompatible with serious employment. Gentler amusements are more proper to unbend and divert the mind, than those tumultuous pleasures which do not leave us the use of reflection. Hunting must ever appear a dangerous employment to a moral and religious man; for ought we not to be afraid of a pleasure which leads to sins and irregularities? How does the health suffer by such a violent exercise, and the sudden transitions from heat to cold! What excesses, what swearing, what cruelties are allowed! How are the horses, dogs, and even the men treated! What mischief done to the meadows and fields! Can all these be called trifles not worth attending to? If we were wise, we should seek pleasures more innocent and pure, and we should certainly find them. Why then should we run after gross pleasures, which always leave remorse and disgust behind them? We have within ourselves an abundant source of enjoyments. A number of intellectual and moral faculties, the culture of which may afford the greatest satisfaction. But it is in this that the great knowledge of a Christian philosopher consists—he has the art of being happpy without much preparation or trouble, and particularly without being so at the expence of his virtue.

LESSON CXXXIX. FORTY-SEVENTH WEEK.

EVERY THING COMBINES FOR THE PRESERVATION OF THE CREATURES IN THE WORLD.

EVERY thing which the beneficent Creator has produced upon our globe is admirably connected with one another, so as to contribute to their mutual preservation. The earth itself, with its rocks, minerals, and fossils, owe their origin and continuance to the elements. The trees, plants, herbs, grass, moss, and all the vegetables, draw their subsistence from the earth, whilst the animals, in their turn, feed upon the vegetables. The earth gives nourishment to the plant, the plant is food for the insect, the insect for the bird, the bird for wild beasts; and, in their turn, the wild beasts become the prey of the vulture, the vulture of the insect, the insect of the plant, and the plant of the earth. Even man, who turns all these things to his own use, becomes himself their prey. Such is the circle in which all things here take their course, that all beings were created for one another. Tygers, lynxes, bears, and a number of other animals, provide us with furs to cover us: dogs pursue the stag and the buffalo, to furnish our tables: the terrier drives the rabbit from its deepest recesses into our snares: the horse, the elephant, and the camel, are trained to carry burdens; and the ox to draw the plough: the cow gives us milk: the sheep its wool: the rein-deer make the sledges fly over snow and ice: the hawk serves us in fowling, and the hen gives us eggs: the cock wakes us early in the morn, and the lark amuses us with its song in the day-time: the whistling note of the black-bird is heard from morn to evening, and then the melodious warbling of the nightingale is charming to the ear. The sportive lambs, the playful calf, the innocent doves, and the stately plumage of the peacock give pleasure to the sight: the very fish come from the depths of the ocean, and go up rivers, in order to furnish plenty of provision for men, birds, and wild beasts: the silk-worm spins its web to clothe us: the bees collect with care the honey we find so useful: even the sea continually throws upon its shores craw-fish, lobsters, oysters, and all sorts of shell-fish for our use: the jack-a-lantern, or great fly of Surinam, shines in the midst of darkness, to give light to the inhabitants of those countries.

If we observe the different occupations of mankind, we shall find that they also tend to this same end which nature purposed. The sailor braves the dangers of the seas and storms, to convey merchandizes which do not belong to him, to their destined place: the ploughman sows and reaps grain, of which he consumes but little himself. Thus, we do not live for ourselves only; for the wise Author of nature has so ordained, that all beings should become useful to one another. Let us learn from thence our mutual duties. The strong should assist the weak; the informed man should assist with his advice those who want it; the learned should instruct the ignorant: indeed we should love our neighbour as ourselves, and thus fulfil the designs of the Creator. The mutual offices men owe to one another have made them form into societies. What divided force could not accomplish, is easily performed by united strength. Nobody could erect a fine building or palace without assistance: one person alone could not lay the foundation, dig the cellars, make and burn the bricks, raise the walls, put on the roof, make the windows, decorate the apartments, &c. but all this is done with ease when the different workmen assist one another. Even the things which appear to us of so little importance, that we scarce deign to look at them, all contribute to make us happy. The very insects we so much despise are useful to us. May it teach us to value as we ought the goodness of our merciful Father, and to be sensible of our own happiness!

LESSON CXL.

COMMON SALT.

THE seasoning most in use, and that which can be the least dispensed with, is common salt. Its flavour is so pleasing, and it has such excellent properties for digestion, that it may be considered as one of the most valuable gifts which nature has bestowed upon us. It is given to us in different ways: those who live near the sea receive it from thence; they dig marshes on the sea-shore, which they call salt-marshes, and plaster them with clay: the sea flows into them when it is rough, and the waves high. The water that remains in the marshes soon evaporates with the heat of the sun, and the salt is left at bottom in great abundance. Nature also produces salt springs, fountains, and lakes. In order to extract the salt out of them, the water is boiled in great caldrons. In other places the salt is found in solid masses in the mountains. The most famous mines are those of Catalonia and Poland. These different kinds of salt are all alike as to their chief properties. Experience has taught us, that salt dissolves in the stomach and bowels; that it has a power of digestion, prevents putrefaction, and too great a fermentation of our food. For this reason it is taken inwardly to promote digestion, to rectify crudities in the stomach, and loss of appetite. It not only dissolves the phlegm, which takes away the appetite, and prevents digestion, but it is also a good stimulus for the stomach, the nerves of which it gently irritates, and promotes all its operations. Most of our food would be insipid and tasteless without salt; yet this is the least of its advantages, when we consider the great use it is of to us in respect to health. Another circumstance in regard to salt will appear interesting to every observer of the works of nature: the smallest grain of common salt seems cut into eight angles, or with six sides, like a die; from whence most masses of this sort of salt must be of a square or cubical form. In this again the

Divine Hand is visible, which has given to salt an invariable form, that has been such from the beginning of the world, and is a very striking proof that it does not owe its original to a blind chance, but to the will of an intelligent Being. This thought is too important and too necessary to our peace, not to make use of every occasion to recollect, and impress it more and more upon our minds.

LESSON CXLI.

ORIGIN OF FOUNTAINS AND SPRINGS.

ALL the great rivers are formed by the union of lesser rivers, and those owe their rise to the rivulets which run into them, and the rivulets to the springs and fountains. But from whence do the springs come? Water, from its height and fluidity, always fills the lower parts of the surface of the earth: from whence then can the water come, which flows so constantly from the highest regions?—In the first place, the rain, the snow, and, in general, all the vapours which fall from the air, furnish a great part of the water which flows from springs; consequently, rivers and springs are very rare in the desarts of Arabia, or in parts of Africa where it never rains. These waters penetrate into the earth, till they find beds of white clay, which they cannot get through: there they accumulate and become fountains, or they collect in cavities, which afterwards overflow, and the water gradually gets through crevices, great and small, falling towards the bottom, to which its weight naturally inclines it. Thus the water continually flows, and makes itself subterraneous currents, with which other currents mix, and by their union form what is called a vein of water. In some countries, the springs do not owe their origin entirely to the waters which fall from the atmosphere; for there are on several high mountains considerable springs and lakes, which do not seem as if they could be produced entirely by snow or rain. There are many springs which give an equal quantity of water at all seasons, and even more sometimes in the hottest and driest weather than when damp and rainy. There must, of course, be other causes both for the rise and supply of springs. Many of them are produced by vapours which are carried up into the atmosphere, and driven by the winds towards the mountains, or, by the power of universal attraction, are drawn towards those great masses. The atmosphere is more or less full of watery vapours, which being driven and pressed against hard and cold rocks, condense immediately into drops, and thus swell the springs.

However, we must still allow that all the springs cannot be owing to this cause: for must not the Danube, the Rhine, and other great rivers which come from high mountains, dry up when these enormous masses in winter are covered with snow and ice. Certainly there must be caverns, which by a communication with the sea or lakes, contribute to form springs. The sea-water, having, gone through subterraneous channels into these great cavities, it rises in vapour through a number of crevices, and forms into drops, which, falling again with their own weight, take sometimes quite another course, because water cannot always penetrate where the vapours do. All the causes here pointed out contribute more or less to the forming of springs; and there may be other causes unknown to us. It is true that nature is always simple in its operations; but this simplicity does not consist in making use of one cause only for each particular effect: it consists in making use of as few as possible, which does not prevent there being always several auxiliary causes which concur in working the effect which nature proposes.

LESSON CXLII. FORTY-EIGHTH WEEK.

SYSTEM OF THE UNIVERSE.

HITHERTO we have only been considering this globe, which is but a speck in comparison of the immense universe. Let us now raise our thoughts to those innumerable worlds, at the sight of which, this spot that we and millions of other creatures inhabit, will appear as nothing. Let us examine, reflect, and adore. The sun, which gives life to every thing, is almost in the centre of the system; and, without changing place, it turns round its own axis, from east to west, in twenty-seven days and twelve hours. All the planets, from Mercury to Saturn, move round the sun in an oblong orbit or ellipsis. Mercury, which of all the globes is nearest to the sun, performs its revolution in near eighty-eight days, but at so small a distance from the sun, that it is generally concealed in its rays, so as to be invisible to us. Venus describes a larger ellipsis, and finishes her course in little more than 224 days. The earth requires a year to perform its revolution; and in this annual journey it is attended by the moon. Mars finishes his course in 687 days; Jupiter, with his four moons, in twelve years, or thereabouts; Saturn moves with his five satellites, round the solar circle, in the space of thirty years. And the Georgium Sidus, with his two satellites (already discovered, and it is probable he has many more) which, of all the planets known to us, is furthest from the sun, in about eighty-two years. But is it possible that the sun, which we daily behold traversing the sky in twelve hours, should remain fixed in the centre of the world? Do we not in the morning see it in the east, and in the evening in the west? Could the earth move round the sun without our perceiving it? This objection, founded on the illusion of our senses, is of no weight. Do we perceive the motion of a boat, in sailing upon the river? and, when we are in a boat or carriage, does it not seem as if every thing round us moved, and as if all the objects went back out of their places, though in reality they never move? However our senses may be deceived in this respect, our reason forces us to acknowledge the truth and wisdom of the system which supports the motion of the earth. Nature always acts in the shortest, easiest, and simplest ways. By the single revolution of the earth round the sun, we can account for the different appearances of the planets, their periodical motions, their situations, their direct and their retrogade motions. And is it not much more natural and easy, that the earth should turn round its axis in twenty-four hours, than that such great bodies as the sun and planets should move round the earth in that space of time? One undeniable proof of the sun, and not the earth, being in the centre of the world, is, that the motions and distances of the planets depend upon the sun, and not upon the earth.

These reflections on the system of the universe are calculated to give us the highest idea of our adorable Creator, and to make us sensible of our own insignificance.

LESSON CXLIII.

GREATNESS OF GOD EVEN IN THE SMALLEST THINGS.

WHOEVER loves to contemplate the works of God, will trace him not only in those immense globes which compose the system of the universe, but also in the little worlds of insects, plants, and metals. He will acknowledge and adore Divine Wisdom as much in the spider's web as in the power of gravitation which attracts the earth towards the sun. These researches are now the easier, as the uſe of microscopes discovers to us new scenes and new worlds, in which we behold, in miniature, all that can excite our admiration. Let us, in the first place, observe the mosses, and the grass, which are produced in such abundance. Of how many fine threads and little particles are those plants composed! What variety in their forms and shapes! Who could count all their sorts and kinds? Think of the multitude of little parts which any one is composed of and into which it may be divided. If an hexagon, of the size of an inch, contains some millions of visible particles, who could calculate the parts of which a mountain must be composed? If thousands of particles of water may be suspended on the point of a needle, how many must there be in a fountain! how many in the rivers and seas! and if a grain of sand contains several thousands of particles of air, how many must there be in the human body! If we pass next to the animated creation, the scene will in a manner extend to infinity. In the summer-time the air swarms with living creatures. Each drop of water is a little world inhabited, and each leaf of a tree is a colony of insects. We see the vast number of flies, gnats, and other insects, which collect together in a very small space; what prodigious shoals must there be in proportion over the whole earth, and in the immense expanse of the atmosphere! Does not the power of the Creator strike us with astonishment, when we reflect on the multitude of parts of which these little creatures are composed, whose existence is scarce known? If we could not at any time prove it by experiments, should we imagine that there were animals a thousand times less than a grain of sand, with organs of nutrition, motion, &c. There are shell-fish so small, that even through a microscope they scarce appear so large as a grain of barley; and yet they are living animals, with very hard houses, in which they are different apartments. How extremely small is a mite, and yet this almost imperceptible atom, when seen through a microscope, is a hairy animal, perfect in all its limbs, of a regular form, full of life and sensibility, and provided with all the necessary organs. Although this animal is scarcely visible to us, it has many parts still smaller. One circumstance particularly admirable is, that the glasses which discover so many defects in the best finished works of man, show us nothing in these microscopic objects but regularity and perfection. How inconceivably fine and tenuous are the spider's threads! It has been calculated, that 36,000 of them would only make the thickness of common sewing silk. How must this strike the mind with astonishment! But could we magnify a mite to appear as large as a grain of barley, what wonders might we not then discover? Even then we should not be able to see to the end, for the more we contemplate the works of God, the more will the miracles of his power multiply in our sight.

LESSON CXLIV.

REFLECTIONS ON SNOW.

DURING winter the ground is often covered with snow: every body sees it fall, but very few take the trouble to enquire into its nature and use. Such is our inattention to objects which we have daily before us, that those things most worth attending to are often what we least value. Let us learn to be wiser, and employ some moments in reflecting upon snow. It is formed of very light vapours, which congeal in the atmosphere, and fall again in flakes more or less thick. In our climates the snow is pretty large; but travellers assert, that in Lapland it is sometimes so small that it is like a fine dry dust. This certainly proceeds from the great cold of those countries. We observe, that the flakes are larger with us in proportion as the cold is more moderate, and they become smaller when it freezes hard. The little flakes of snow are generally like hexagon stars; but there are some of eight angles, others of ten, and some of an irregular shape. The best way of examining them is to receive the snow on white paper. But there has not hitherto been any satisfactory cause given for the variety of forms. As to the whiteness of this meteor it is not difficult to explain. Snow is very thin and light, consequently it has a great many parts, which are full of air. It is besides composed of parts more or less close and compact: such a substance does not admit the rays of the sun or absorb them; on the contrary, it reflects them very strongly, which makes it appear white to us. Snow newly fallen is twenty-four times lighter than water. If twenty-four measures of snow were melted, they would produce but one of water. Snow is not frozen water, but only frozen vapours. It evaporates considerably, which the most intense cold cannot prevent. It has been doubted whether it snowed at sea; but those who have gone voyages in the winter on the northern seas assure us they have had a great deal of snow there. It is known that the high mountains are never entirely free from snow. The air being much warmer in the plains than on heights, it may rain with us while it snows heavily on high mountains. Snow is of use in several ways. As the winter cold is much more hurtful to vegetables than to animals, the plants would perish if they were not preserved by some covering; therefore it is wisely ordered, that the rain, which in summer cools and revives the plants, should in winter fall in the form of soft wool, to cover the vegetables, and to guard them from the inclemency of frost and winds. The snow has a degree of warmth in it; but not too much, so as to choak the grain. As, like all other vapours, it contains different salts, which it leaves in the ground when it melts, this much enriches the earth. The melted snow not only moistens the earth, but washes every thing hurtful away from the winter seeds and plants. What remains of the snow-water helps to fill up the springs and rivers which had diminished during the winter.

These reflections may convince us, that winter has its advantages, and is not so melancholy a season as many imagine. Let us look up with joy and gratitude towards that beneficent Being who causes blessings to flow even from the clouds of snow upon the earth.

LESSON CXLV. FORTY-NINTH WEEK.

SLEEP OF ANIMALS DURING WINTER.

THERE are many animals during winter which continue in a state of inactivity or sleep. This is the case with the snails, the ants, flies, spiders, caterpillars, frogs, lizards, and serpents. It is a mistake to suppose that the ants lay up provisions for the whole winter: they lay up a store for autumn, but the least frost benumbs them, and they remain in that state till the return of spring. Great part of what they collect in summer, with so much care, is not for their subsistence only, they use it as materials to build their habitations. There are also many birds, which, when food begins to fail, hide themselves under ground, or in caves, to sleep all the winter. The shore-swallows hide under ground, the wall-swallows in the hollows of trees, or old buildings, and the common swallows go to the end of ponds, and fasten themselves in pairs to some reeds, where they remain lifeless and motionless till they are revived by the return of fine weather. There are also some beasts which bury themselves in the ground at the end of summer. The most remarkable of them is the mountain rat, which generally makes its abode in the Alps. Though it loves to be on the highest mountains, in the region of ice and snow, it is sooner benumbed with cold than any other animal; for which reason it retires in autumn into its subterraneous lodging to remain there till spring. Their winter-residence has two branches both terminating in a place without any opening. One of these two wings go sloping underneath their dwelling-place; where they leave their excrement, which the wet carries away. The other wing is the highest, and is their place of going in and coming out. They make no provision for winter, as it would be useless to them; but before they enter they each prepare themselves a bed of moss and hay; and then, having closed the entrance into their houses, they compose themselves to sleep. As long as this state of insensibility lasts they live without eating. At the beginning of winter they are so fat that some of them weigh twenty pounds; and by degrees they fall away, and are very thin in spring. It is said, that as soon as these animals begin to feel the cold, they go to some spring, and drink copiously for a long time, till what they discharge is as clear, and as pure as when they drank it. A natural instinct prompts them to it, in order to prevent the corruption which the accumulated matter in their stomachs might occasion during their long sleep. When these rats are discovered in their retreats, they are found rolled up round, and sunk into the hay. Their nose is laid on their belly, that they may not breathe a damp air. During their torpid state, they are carried away without being awakened, and they may even be killed without appearing to feel it. There is another sort of rats, whose sleep is equally long and sound as these, and are therefore called the sleepers.

The bears eat more at the beginning of winter, which enables them to bear their abstinence during their winter's repose. The badgers prepare for their retreat into their burrows in the same manner. The instinct of these and many other animals, teaches them thus to dispense with food for a considerable time. In their peaceable retreats, they know not what want, hunger, or cold is; they know no season but summer. But all animals do not sleep thus in winter: it is only those which, with the severe cold, can also support an abstinence of several months. If winter was to come upon them unprepared, and that suddenly, weakened and benumbed with want of food and the cold air, they would still survive it, the only thing we could wonder at would be the strength of their constitution. But as they know how to prepare in time for their sleep, with much care and precaution, it must be imputed to a wonderful instinct bestowed upon them by the universal Creator.

LESSON CXLVI.

THE USE OF WOOD.

HOWEVER great and numerous the advantages we derive from every part of a tree, yet there is none to be compared to the use we make of the wood itself. It grows in great abundance, and answers every purpose we wish. It is soft enough to take any form we please; and hard enough to keep that which is once given to it; and as it is easily sawed, bent, and polished, it furnishes us with many utensils, conveniences, and ornaments. It is true, that nature furnishes a great quantity of heavy compact bodies; yet we have wants still more indispensable, which we could scarce supply without solid thick wood. We have stones and marble, of which we make many uses; but it is such labour to get them out of their quarries, to convey them to any distance, or to work them, that it is very expensive; whereas we may make use of the largest trees, with very little trouble or expence in comparison. By sinking into the ground wooden piles of sixty or ninety feet long, a sure foundation is made for walls, even in loose sand or mud, which would otherwise fall in. These piles, strongly driven down, and made firm, form a forest immovable, and sometimes incorruptible, in the ground or water, able to sustain the largest and heaviest buildings. It is wood or timber that supports the brick-work, and weight of tiles and lead of which the roofs of our houses are composed. Wood is also a preservative of life, as in many places it is our chief fuel. The long winter nights, the cold fogs, and the north wind, would freeze our blood, if we were deprived of the comfortable warmth of fires. How necessary therefore is fuel to us! Was it not for the wisest purposes that the Creator of the world covered one half of the surface of our globe with wood, and yet are we not apt to forget this? Do we always consider as a favour the many uses it is of to us? Are we sensible how much it contributes to our welfare? Or because these blessings are too common, do we therefore think them of less importance? It is true, it is easier to acquire wood than gold or diamonds; but, is it therefore less a peculiar blessing of Providence? Is it not the plenty of wood, and the ease with which we acquire it, that ought so much the more to excite our gratitude, and lead us to bless the Creator of this invaluable gift, the measure of which is so well proportioned to our wants? Such reflections would prove constant subjects for thanksgiving, if we accustomed ourselves to this pleasing, though serious turn of mind. Particularly at this season we are furnished with many occasions to bless God for the mercies he grants to us, and which we ought never to forget.

LESSON CXLVII.

AN EXHORTATION TO REMEMBER THE POOR AT THE SEASON OF WINTER.

THOSE who are quietly sitting in convenient cheerful houses, and who hear the whistling of the sharp north wind, let them reflect on their unhappy fellow-creatures, many of whom are suffering the utmost severity of poverty and cold. "Happy those who at this "season have a house to shelter them, clothes "to cover them, bread and the fruit of the "vine to refresh them, with a bed of down on "which they may repose and yield to pleasing "dreams. But there are some poor persons "without even the necessaries of life! without "shelter, without clothes, often stretched upon "a bed of pain, and too modest to proclaim "their wants." We ought all to be touched with the misery of this order of people. How many poor creatures distressed with cold and hunger? How many old people with scarce any thing to cover them! How many sick are there without food or nourishment, lying on straw, in miserable huts, where the wind, the cold, and the snow penetrate! Winter renders benevolence to the poor more necessary, because it increases their wants. Is it not the time in which nature itself is poor? and is it not adding double value to our benefactions to bestow them seasonably? If we have been enriched with the summer and autumn fruits, was it not with the intention that we should share them with our fellow-creatures, now when nature is at rest! The more the cold increases, the more disposed we should be to relieve the necessitous; to pour into the bosom of poverty all we can spare. What other end could Providence propose in the unequal division of earthly riches, were it not to excite beneficence in the wealthy, by the affecting scenes of the miseries of the poor. Let us therefore have compassion on our fellow-creatures, and not let them suffer more than even the brutes. It is our duty to soften their evils, and Providence permits us to have a share in this honour. It is our duty to clothe, to feed, and to comfort them. Nobody is so poor, but that they may do some good. Let us enjoy the sweetest satisfaction that a noble mind can feel; by relieving the wants of others; by softening and lessening their weight of adversity. How easy is it to do this! We need only retract a few of our expences in dress and pleasures. How fit an offering would it be to virtue, were our benevolence to be attended by a conquest over our passions, in retrenching the indulgence of luxury and vanity, in order to bestow our charity on the poor!

LESSON CXLVIII. FIFTIETH WEEK.

NATURE IS A LESSON FOR THE HEART.

WE gain, in every respect, by studying nature; and it may with reason be called a school for the heart, since it clearly instructs us in our duty towards our Maker and our neighbour. Can any thing inspire us with more profound veneration towards God, than the reflection that it is He who has formed our globe from nothing, and his Almighty Hand also that confines the sun within its orb, and the sea within its bounds? Can we humble ourselves too much before that Being who created innumerable worlds which roll over our heads? What are we in comparison to those immense globes, and how little must the earth in all its glory appear, when considered in that light! Must we not shudder at the very thought of offending Him, whose boundless power we every moment see proofs of, and who, with a single glance, can destroy or make us wretched? But the contemplation of nature is also highly calculated to fill us with love and gratitude towards its Author. All nature loudly proclaims this comfortable truth, that God is love. It was love which induced him to create the world, and to communicate to other beings the felicity which he himself enjoys. For this purpose, he created the universe, and an innumerable multitude of creatures, that all of them, from the angel to the worm, should feel, each according to its nature and capacity, the effects of Divine Goodness. Is there a single creature, which does not furnish proofs of his immense goodness? But, if we reflect on ourselves, how many may we not find? The Creator has endowed us with reason, to enjoy his blessings, and to acknowledge this love with which he honours us. He hath given us dominion over the animals, to make them subservient to our wants and conveniences. It is for us that the earth produces fruit in such abundance. So many blessings daily enjoyed, to which we owe the continuance of our existence: and the disinterested regard of this great Being, who can receive no return from his creatures, ought to excite in us the most grateful love for our bountiful Creator? who maketh his sun to rise on the evil and on the good, and sendeth rain on the just and on the unjust.

LESSON CXLIX.

THE VERY THINGS WHICH APPEAR HURTFUL MAY BE FOR OUR BENEFIT.

THE evils we sometimes meet with enhance the value of our blessings, as colours are relieved and set off by shade. If there was no winter, should we be as sensible as we are of the charms of spring? Should we know the value of health without sickness, the sweets of repose without labour, the peace and consolation of a good conscience, if we had never been tried and tempted? The more obstacles there are to our happiness, the greater our joy when we surmount them. The heavier our misfortunes are, the more happy we feel when delivered from them. If all our days were prosperous, we should give ourselves up to luxury, pride, and ambition. If we were never pressed to it by necessity, nobody would take the trouble to be active or laborious in business: nobody would make use of their talents, or cultivate their minds; nor would they be animated with zeal for the public good. If we were never liable to danger, how should we become prudent, or learn compassion? If we had no evils to fear, how easily should we be intoxicated with happiness, and forget our gratitude to God, charity towards our neighbour, and all our duties in general! Are not then these virtues, those blessings of the soul, preferable to a constant train of pleasing sensations, which would also become dull and insipid to us by possession. He who reposes always in the lap of felicity, soon grows negligent of doing good, and is incapable of any great action; but let him feel the strokes of adversity, and he will recover his wisdom, activity, and virtue. How unjust and inconsistent are the desires of man! They wish to live quiet, contented, and happy, and they object to the means which lead to it. In the heat of summer we sigh for coolness; and yet we are displeased when we see the clouds collect which are to obtain this for us. hunder-storms purify the air, and make the arth fruitful; yet we complain that the flashes of lightning terrify us. We acknowledge the use of coals, minerals, and baths, but we do not like earthquakes. We wish that there should be no infectious or epidemical disorders, and yet we complain of the storms which prevent the air from corrupting. We love to be attended by servants, and yet we wish there was no poverty or inequality of situations. In a word, we wish in most things for the end without the means. Let us acknowledge the wise and beneficent designs of God, even when he permits frequent alternatives in our lives, from joy to sorrow, from happiness to misery. He is our Father, whose goodness we ought to be convinced of, even when he thinks proper to chasten us! We are in a world subject by nature to revolutions, and have often experienced, in the course of our lives, that what our ignorance made us consider as an evil, has in reality proved a happiness to us. Let us then receive with calm resignation the evils with which we are afflicted: they will only appear terrible at first; the longer we are used to them, the more supportable we shall find them, and the more we shall feel their salutary effects. We shall at length be convinced, that without these afflictions, which we now lament, we should never obtain the happiness designed for us hereafter.

LESSON CL.

INCIDENTAL REVOLUTIONS OF OUR GLOBE.

NATURE every day produces of itself changes on the surface of the earth which affect the whole globe. Many ancient monuments prove, that its surface in several places sinks down more or less; sometimes quicker, sometimes slower. The wall built by the Romans in Scotland, in the second century, which went across the whole kingdom, from sea to sea, is at present almost entirely under ground; and there are remains of it every day still discovered. The mountains are exposed to the same overthrow, occasioned either by the nature of the ground, the waters which undermine and sap them, or by subterraneous fires. But when some parts of the globe sink down, there are others, on the contrary, which rise up. A fertile valley, at the end of another century, may be converted into a marsh, where clay, turf, and other substances, form beds one over another. Lakes and gulphs turn into land. In stagnant water there grows a quantity of rushes, sea-weed, and other plants. The animal and vegetable substances, by corrupting in it, gradually form a sort of mud and mould; and the bottom at last rises so high, that what was formerly water becomes dry land. The subterraneous fires also produce great changes on our globe, which are called earthquakes. These violent shocks and convulsions occasion great devastation, and considerable alterations on the surface of our planet. The outer coat of the earth breaks in different places, sinks in on one side, and rises up on the other. The sea also partakes of those commotions; and the most sensible effect that appears from them are the new islands which rise up. They are produced by the bottom of the sea being raised up; or they are composed of pumice stones, of calcined rocks, or other substances thrown out from some volcano.

History informs us, that by earthquakes, which subterraneous fires occasioned, whole cities have been swallowed up, and sunk sixty feet under ground; so that afterwards the earth which covered them was sowed and cultivated. Several of the alterations produced on our globe have been caused by the undermining of waters. The course of water is often diverted. Even the banks change their place. Sometimes the sea retires, and leaves whole continents dry, which used to be its bed. Sometimes it overflows lands, and covers whole countries. Kingdoms that were formerly close to the sea, are at present removed to a great distance from it. The anchors, the great iron rings to moor vessels, and the wrecks of ships found upon mountains, in marshes, and at a great distance from the ocean, prove beyond a doubt, that many places which are now firm land were formerly covered by the sea. There is every reason to believe, that England was formerly joined to France: the beds of the earth and stone, which are the same on both sides of Calais, and the shallowness of that strait, seem to prove it. Countries nearer the pole are liable to great change by the severity of cold. In autumn, the water penetrates through a multitude of little crevices into the rocks and mountains. It freezes there in winter, and the ice dilating and bursting causes great havock. From hence we may learn, that all things here are are subject to constant vicissitudes. In all this, how evidently does the wisdom, power, and goodness of the Creator shine forth!

LESSON CLI. FIFTY-FIRST WEEK.

OF THE CLOTHING PROVIDED FOR US BY PROVIDENCE.

THE goodness of Providence appears even in our clothing. How many animals bestow upon us their skins, their hair, and their fur, for this purpose. The sheep alone, with its wool, furnishes the most necessary part of our dress; and it is to the valuable labour of a worm that we owe our silks. How many plants also do we find of use in this respect! Hemp and flax furnish us with linen, and many different textures are formed of cotton; but even those vast stores of nature would be insufficient, if God had not endowed man with industry, and with an inexhaustible fund of invention, to contrive and prepare clothing of many sorts. When we reflect on all the preparations for making linen, we shall find how many hands are necessary for a few yards only. Let us not then be vain of our dress, as we must have recourse for it, not only to the animals most contemptible in our eyes, but also to the rank of people our pride disdains the most. But why has the Creator obliged us to provide ourselves with clothing, while every animal receives theirs directly from nature? We may answer this question by saying, that it is for our good. It is, on the one hand, useful to our health, and, on the other, adapted to our way of life. We may, by these means, suit our dress to the different seasons of the year, the climate we live in, the situation and profession we have chosen. Our clothes promote insensible perspiration, so essential to the preservation of life. The necessity of obtaining them for ourselves exercises the human mind, and has given rise to the invention of many arts. And, the labour it requires furnishes subsistence for a number of persons. We have, therefore, great reason to be content with this plan of Providence: let us only take care not to frustrate the designs proposed by it. A good man ought never to glory in the outward ornaments of his body, but rather in the inward qualities of his mind. Pride assumes many different forms. It glories inwardly in the most trifling advantages. And, in regard to the outside, some show their pride under the splendour of silks, gold, and jewels, whilst others hide and nourish it under rags. The good man will equally avoid either extreme.

LESSON CXLII.

THE POLAR STAR.

NONE of the northern constellations are more remarkable than that which is nearest to the arctic pole, and is called the *Lesser Bear*. The extremity of its tail is but two degrees from the pole, and for that reason it is called the *Polar Star*. It is easily distinguished from the stars which appear to be near it, because its position is so little varied. It turns round the pole, but its motion is so slow, and the circle it describes so small, that it is scarcely perceptible. As it is therefore visible always in the same point of the sky, it is a sure guide to the mariner, particularly in the open seas. Before the discovery of the compass, the sailors had no surer guide than the polar star; and even at this time, when the sky is serene, they may on many occasions better depend upon it than on the magnet. This reflection naturally leads us to admire the goodness of God, who, by the situation and course of the stars, has given us such a sure knowledge of times, places, and the different points of the sky. An astronomer, though in an unknown country, can tell by the stars exactly where he is. He can know the month, the day, and hour, as certainly as if he had consulted the best watch. If, for example, we only observe that the stars come every day four minutes sooner to the place where they were the day before, we consequently know that this makes two hours in each month. Thus, the star which we see this night, at ten o'clock, in a certain part of the sky, we shall see it again, on the same day of next month, at eight o'clock, if we observe it from the same place we are now in. The star which is now at midnight to be seen over our heads, will a year hence be in the same spot.

Let us here acknowledge God's tender mercies towards all the world. How much those would deserve pity who have neither clocks nor geographical maps, if they could not supply the want of them by the observation of the stars. If we put ourselves in the place of those people, these reflections cannot appear indifferent to us; for we must be devoid of all feelings or humanity, if objects which do not indeed directly concern us, but which interest so many of our fellow-creatures, should appear unworthy our attention. Let us look up with gratitude towards the Creator of all things. The use that the stars are of, in this respect to mankind, is certainly one of the least advantages which result from the existence of those heavenly bodies: and yet this advantage alone merits our praise and thanksgiving.

LESSON CLIII. FIFTY-SECOND WEEK.

COMPARISON OF MEN AND ANIMALS.

MAN chiefly resembles animals in respect to matter. We have, like them, life and organized bodies, which are produced by propagation and birth, and supported by food. We and they have also alike animal spirits, powers to fulfil the different functions assigned to us, contrary motions, the free exercise of our limbs, senses, sensation, imagination, and memory. We are equally liable to those general bodily accidents which the chain of things, the laws of motion, the construction and organization of our bodies, must necessarily occasion.

In respect to the happiness resulting from sensual pleasures, animals have many advantages over us. They do not require the clothes, defence, and conveniences we want; nor are they obliged to invent, to learn, and exercise the arts necessary for these purposes. At their birth they bring with them every thing they want, or at least have only to follow the instinct which is innate in them, to obtain all that can make them happy. This instinct never deceives them: it is a constant, sure guide: and as soon as their appetites are satisfied, they are perfectly content, they desire no more. In all these circumstances they have the advantage of man, who must reflect, invent, labour, exercise, and receive instructions, or he would remain in perpetual childhood, and could scarce procure himself the necessaries of life. His instinct and passions are not sure guides to him. He would be wretched were he to give way to them. Reason alone, and its consequences, make the essential difference between him and the brutes; it supplies all deficiencies; and, in other respects, gives a superiority to which they can never attain. By means of this faculty, he obtains every necessary convenience, and multiplies the pleasures of sense: it ennobles them, and makes them so much the more sensibly enjoyed, as he can render his desires subservient to reason: his soul is capable of pleasures entirely unknown to animals: pleasures which spring from wisdom, science, order, religion, and virtue, and which infinitely surpass all those of which the senses are the organs. He makes continually new discoveries, acquires further lights, and makes boundless progress in the road to perfection and happiness; whereas the beasts are always confined within their narrow limits, never invent or improve, nor ever rise above other animals of their species. It is reason alone that gives us the superiority over the brute, and it is in this that the excellence of human nature mostly consists. To make use of our reason in order to ennoble the pleasures of sense, and to enjoy more and more those that are intellectual, so as to improve daily in wisdom and virtue, this is what distinguishes man: this is the end for which he was created. Let it then be our constant study to answer this purpose; for we can only be happy in proportion as we follow that which reason points out to us as useful and right.

LESSON CLIV.

INSTABILITY OF EARTHLY THINGS.

THERE is nothing in nature that is not liable to change. Every thing is uncertain and frail. The most solid bodies are not so impenetrable, nor their parts so closely united, as to preserve them from dissolution. Each particle of matter insensibly changes its form. How many changes has each of our bodies undergone since its formation in our mother's womb? Every year it has lost something of what made a part of itself, and has acquired new parts drawn from the mineral, vegetable, and animal substances. Every thing on earth increases and decreases by turns; but with this difference, that the changes do not operate so quickly in some bodies as in others. The celestial globes appear to be still the same as at the moment of their creation; and they are perhaps the most invariable of all bodies. Those, however, who have observed them with attention, perceive that some stars have disappeared, and that the sun has spots which change, and thus they prove that it is not constantly the same. Its motion also makes it liable to variation: and though it is never extinguished, it has been obscured by fogs, clouds, and even by internal revolutions. This is all we can know of it at the immeasurable distance that it is from us. How many other external as well as internal changes we should discover, were we nearer! If we are still more struck with the instability of earthly things, it is because they are within our view. How frail are these! and how liable to change! Each object continues to look like itself, and yet how different in reality is it from what it was! We daily behold things taking new forms: some growing, others diminishing and perishing. This year, which in a few days will be at an end, affords undeniable proofs of it. In each person's own little circle, they must have experienced many revolutions. Several of those we had known for many years are no more: many whom we have seen rich are become poor, or at least are but in an indifferent situation. If we examine ourselves also, we shall find a difference in many respects. Has not our health and activity diminished? And are not all these things warnings of approaching towards that great and final revolution which death will operate upon us? Besides, there are many changes that may still happen in the few remaining days of this year. We may become poor or sick; we may experience the infidelity of friends, or even die in that space of time. Such reflections might oppress and sink us to despair, if religion was not our support and consolation. But this leads us to the only invariable, everlasting Being, whose very nature is immutability, and whose mercy has no end.

LESSON CLV.

CALCULATION OF HUMAN LIFE.

THE approaching close of the year leads me to reflections, which, however important they may be, do not always occupy me as they ought. In order to feel more sensibly how short the date of life is, I will examine now the use I have made of the past days; though I have reason to believe it will prove a subject of humiliation to me.—I first recal to myself those days it was not in my power to command. How many hours then employed in mere bodily wants? How many more have passed in trifling occupations of no service to the mind? Thus, in slightly looking over the use made of these years, I discover a number of days lost to the immortal soul, which inhabits this body of clay; and, after these deductions, what will remain which I may justly say have been employed for real use?

Out of 365 days, it is plain, that I can scarce reckon fifty which I can call my own, as having promoted my eternal happiness. And the little that remains of time, how much do I lose of it by my own fault and weakness! With some, how many days have been sacrificed to vice and folly! Perhaps many of those days granted me for reflection have been devoted to the world, to vanity, to idleness, and false pleasures. Perhaps they may have been profaned by envy, jealousy, slander, and other vices, which betray a heart void of respect for our Maker, and charity to our neighbour. Even since God has made me better, and inspired me with a desire to walk in his paths, how much time has been irrecoverably lost in thoughtlessness, indifference, doubts, anxiety, want of temper, and all those infirmities which are the effects of our frailty, and weakness of reason. How swiftly does the little space of time we can dispose of fly away! A year passes almost insensibly, and yet a year is of great consequence to a being whose life is reckoned by hours. When we recollect how little of it we may have spent suitably to the purposes of our creation, we might well wish to recal those hours which were ill employed: but it would be in vain. The year, with the good and bad actions which have marked it, are swallowed up, for ever in eternity. . . . .

Forgive us, then, O merciful Father, the faults we have committed; and grant us thy grace in the hour of death, in the day of judgment, and to all eternity.

FINIS.

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